

**IN THE UNITED STATES DISTRICT COURT  
FOR THE WESTERN DISTRICT OF TEXAS**

GENERAL LED OPCO, LLC,	§	
	§	
Plaintiff,	§	
	§	
vs.	§	Civil Action No. <u>17-1281</u>
	§	
PRINCIPAL LED, LLC.,	§	
	§	
Defendant.	§	
	§	
	§	

**PLAINTIFF'S ORIGINAL COMPLAINT**

Plaintiff, General LED OpCo, LLC ("General LED"), complaining of Defendant, Principal LED, LLC, states as follows:

**I.  
PARTIES**

1. General LED is a Delaware limited liability company with its principal place of business at 1074 Arion Circle, #116, San Antonio, TX 78216. General LED formerly was known as "General LED, Inc.," but the company changed its name and converted from a business corporation to a limited liability company named "General LED OpCo, LLC" on March 31, 2017.

2. Defendant Principal LED, LLC ("P-LED") is a limited liability company organized and existing under Texas law. Its principal place of business is located at 4541 N Bentwood Dr., San Angelo, Texas 76904, an address within the Western District of Texas. Principal LED, LLC can be served with process herein by delivering the citation and a copy of this Original

Complaint to its registered agent for service of process, J. Bryan Vincent, at 3490 Venture Dr., San Angelo, Texas 76905.

## **II. JURISDICTION AND VENUE**

3. This is an action for the infringement of General LED's United States Patent No. 9,702,531, entitled "Retrofit system and method for replacing linear fluorescent lamp with LED modules" (the "531 Patent"), and is brought pursuant to 35 U.S.C. § 1, *et seq.*<sup>1</sup> Plaintiff seeks damages, injunctive relief, and other relief under 35 U.S.C. § 281, *et seq.*

4. This Court has subject matter jurisdiction over this action pursuant to 28 U.S.C. §§ 1331 and 1338(a) because this action for infringement of a United States patent arises under the laws of the United States, 35 U.S.C. §§ 271 and 281-85.

5. This Court has personal jurisdiction over Defendant because Defendant is a Texas resident.

6. Venue is proper in the Western District of Texas pursuant to 28 U.S.C. §§ 1391 and 1400(b) because Defendant's principal place of business is in this district, Defendant is subject to personal jurisdiction in this district, and Defendant has committed acts of infringement in Texas by using, promoting sales and offering for sale or selling, or inducing others to use, sell, or offer for sale, in Texas, systems and products that infringe one or more claims of the '531 Patent.

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<sup>1</sup> A true and correct copy of this patent is attached hereto as Exhibit A, which is incorporated herein by reference as if set forth verbatim.

### **III. FACTUAL BACKGROUND**

#### **A. General LED is a leader in the LED industry.**

7. Based in San Antonio, General LED is a nationally and internationally recognized producer, manufacturer, and distributor of light emitting diode (“LED”) products and solutions. As a result of its innovation and substantial effort and expense, General LED has become a leader in the design, engineering, and production of lighting products employing LED technology. As such, it has made substantial advances to relevant technologies, including in the replacement of linear fluorescent lamps with LED lighting.

8. Among other things, General LED and its subsidiaries sell products for use in cabinet signs and other types of exterior commercial building signage. These uses require reliable and long-lasting lighting devices with economical operating costs.

9. Linear fluorescent lamps have been the preferred light source for these sorts of commercial applications for much of the twentieth century. The many types of linear fluorescent lamps currently in use range from a nominal size of less than one foot to a nominal size of ten feet. Because of the many standard sizes of linear fluorescent lamps in commercial lighting, commercial signage often is designed around the nominal length of the linear fluorescent lamps.

10. While linear fluorescent lamps generally are less expensive to operate than the incandescent light bulbs that they replaced, increases in the

cost of electricity have led to demand for lighting sources that are less costly to operate than linear fluorescent lamps.

11. Several decades ago, LEDs became available as a lighting source. Initially, the low light output of LEDs limited their use to indicator lights typically associated with electronic control systems. Since the initial introduction of LED lights, their light output has increased significantly. Today, the light output of LEDs rivals that of linear fluorescent lamps. In addition, LEDs are less expensive to operate than linear fluorescent lamps and have a longer useful life and higher reliability. As a result, the operational cost of LEDs is less than that of conventional linear fluorescent lamps.

12. Fluorescent lamps also suffer from certain limitations. They generally only provide white or off-white light, while colored light is desirable for some applications. They also are limited by their linear shape, which restricts their placement to straight raceways within signage.

13. Lighting systems employing LEDs can be designed to overcome these shortcomings. In contrast to fluorescent lamps, LEDs can emit a more natural light as well as light in various colors. In addition, LEDs typically are sold as modules including one or more LED lights. These LED modules generally are connected to each other by wires. This means they can be installed in non-linear configurations. Thus, for commercial lighting designers, LED lighting provides both more flexibility and less cost over time.

14. Since fluorescent lighting has been around for more than half a century, it has been widely installed in cabinet signs and other types of signage.

Many of the commercial cabinet signs designed for fluorescent lamps will remain in use for many years to come. Building owners and other cabinet sign users would prefer not to replace their existing cabinets, but nonetheless would like to use LED lighting in their signage. Accordingly, a need has developed in commercial lighting applications for a system and method to replace linear fluorescent lamps with LED modules in existing cabinet signs designed and built for the mounting of linear fluorescent lamps.

15. General LED makes and sells industry-leading LED lighting systems and modules, including products designed to replace linear fluorescent lamps in existing cabinet signs, which are commercialized under the brand name “RetroRayz.” The RetroRayz products have an innovative LED module support structure that can be attached to raceways within the linear fluorescent lamp cabinet signs or to the fluorescent lamp sockets mounted in the raceways. This allows the use of existing sign cabinets with modern LED lights taking the place of the original fluorescent bulbs.

**B. General LED’s Patent.**

16. In order to protect its investment of intellectual and financial capital in the development of its products and technologies, General LED pursued patent protection for its innovations. The company’s technological advances have led to the issuance of numerous United States patents.

17. This action centers on the ‘531 Patent, which is entitled “Retrofit system and method for replacing linear fluorescent lamp with LED modules.” As its title reflects, the ‘531 Patent claims certain technology relating to replacing

fluorescent lamps with LED modules. The inventors of the claimed technology are two engineers who work for General LED, Aaron Gorman and Gray Lankford.

18. The '531 Patent was issued by the United States Patent and Trademark Office on July 11, 2017. General LED is the owner, by way of assignment, of all right, title, and interest in the '531 Patent, including the right to bring claims for its infringement.

19. Patent law both imposes a duty on patent applicants to submit relevant prior art to the PTO and assumes that examiners use this information to determine an application's patentability. In seeking the '531 Patent, General LED disclosed various references to the PTO, including Defendant's US Patent Application Number 14/582,944. The '531 Patent was granted over these references. It therefore now enjoys a strong presumption of validity that can be overcome only by clear and convincing evidence.

**C. General LED's dealings with Defendant.**

20. Like General LED, Defendant P-LED makes and sells LED signage and LED signage parts. From its facility in San Angelo, Texas, Defendant markets its products across the U.S. through a number of distributors, including one or more within the Western District of Texas.

21. Defendant's senior corporate officer Bryan Vincent once worked for General LED. He later became a founding member and officer of Defendant.

22. Defendant makes, sells, and offers for sale a number of products that infringe General LED's '531 Patent. These infringing products are identified further below.

**IV.**  
**CLAIM FOR PATENT INFRINGEMENT**

23. All of the preceding paragraphs of this Complaint are incorporated herein by reference as if set forth verbatim.

24. Plaintiff owns and holds all legal right, title and interest in the '531 Patent.

25. Defendant has never had authority or permission to make, use, offer for sale, or sell in the United States the subject matter claimed in the '531 Patent.

26. As recited in Claim 5 of the '531 Patent, Plaintiff's claimed invention is a system for replacing linear fluorescent lamps with LED modules in a cabinet sign having raceways, said cabinet sign being previously constructed and arranged for mounting linear fluorescent lamps in sockets between the raceways, said system comprising:

an **extruded hollow LED module support structure** (Feature 1) **cut substantially to the length of a linear fluorescent lamp** (Feature 2);<sup>2</sup>  
**connecting** said extruded LED module support structure **using one or more** the following:

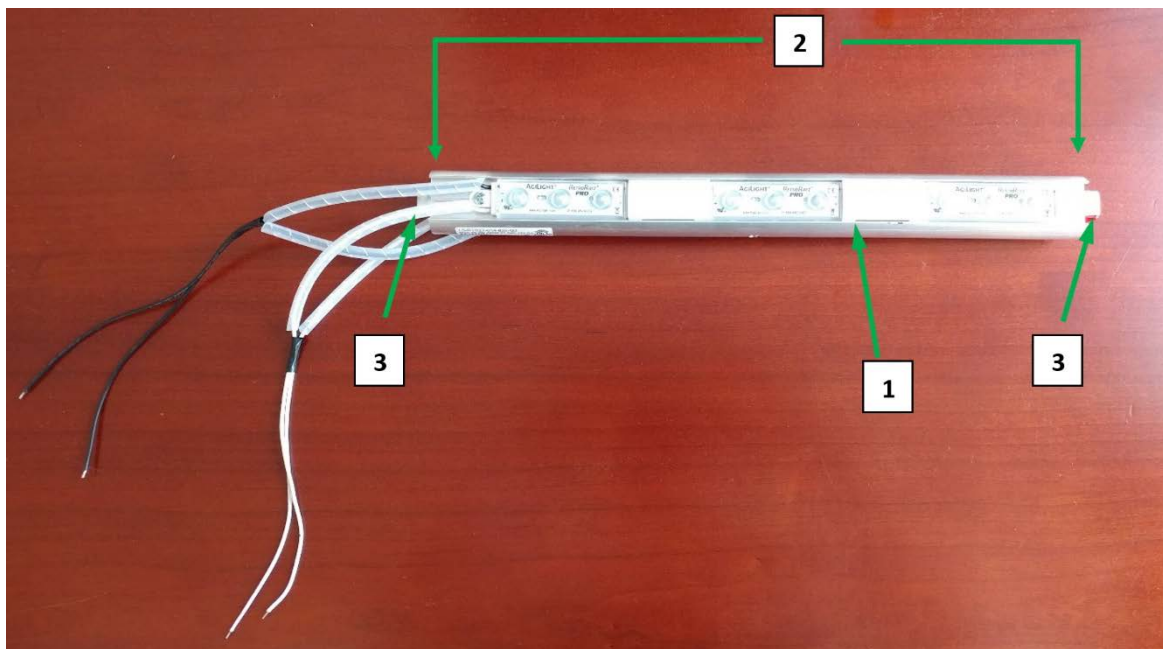
- a) at least one mounting tab constructed and arranged for attachment to one or both raceways in the cabinet sign, said at least one mounting tab being formed on an end of said extruded hollow LED module support structure;

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<sup>2</sup> The bold-faced numbers are used to denote the corresponding features of the pictures set forth below.

- b) a three-sided connector constructed and arranged for attachment to one or both raceways in the cabinet sign, said three-sided connector enabling the position of said extruded hollow LED module support structure within said cabinet sign; and
- c) an engagement of an end of said extruded hollow LED module support structure with one or both of the linear fluorescent lamp sockets (Feature **3**).

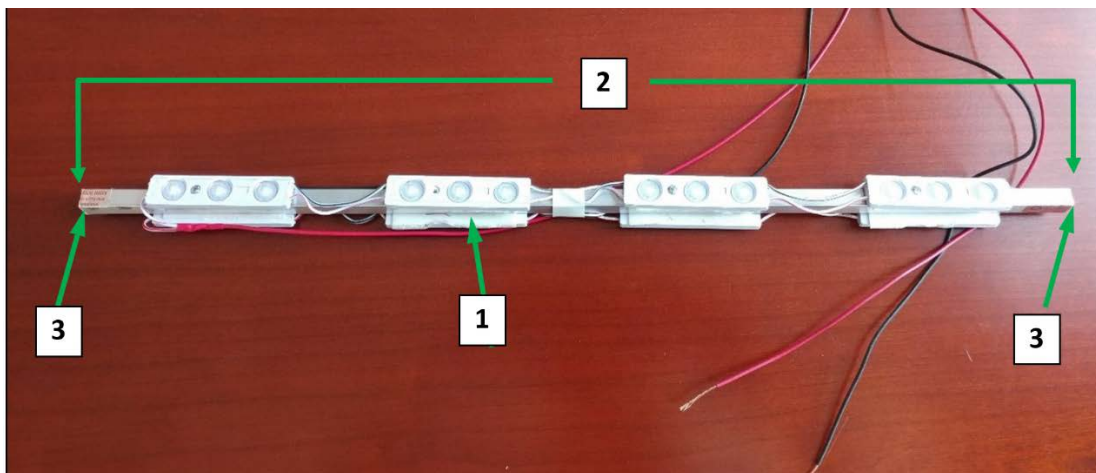
27. A picture of one of Plaintiff's products embodying the invention of the '531 Patent, with certain features marked by green arrows, appears below.<sup>3</sup>



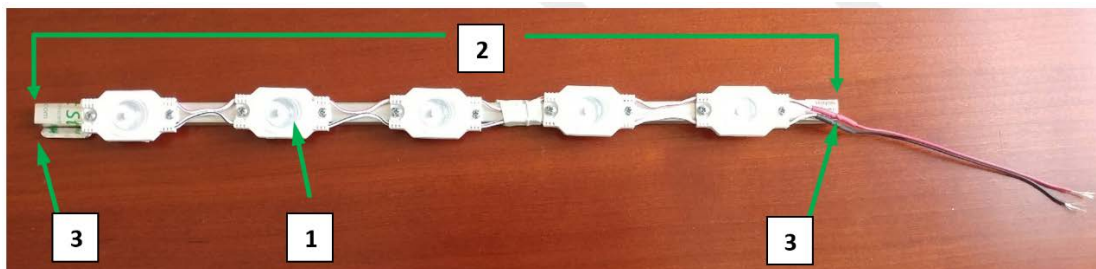
<sup>3</sup> A copy of this picture is also attached hereto as Exhibit B and is incorporated herein by reference.



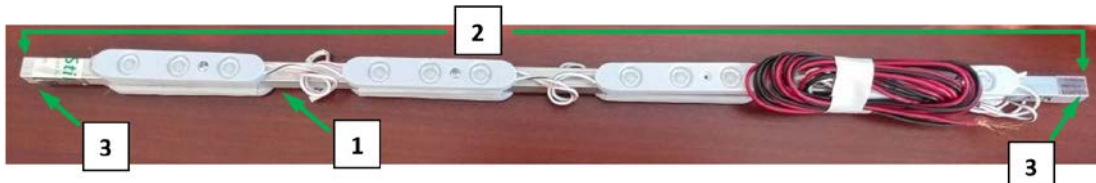
28. Defendant sells an infringing product called “Tap Out,” which is pictured below with the infringing features marked by green arrows.<sup>4</sup>



29. Defendant also sells an infringing product called “Slim Stik,” which is pictured below with infringing features marked.<sup>5</sup>



30. Defendant also sells an infringing product called “Street Stik,” which is pictured below with infringing features marked.<sup>6</sup>



<sup>4</sup> A copy of this picture of the infringing Tap Out product is attached hereto as Exhibit C and incorporated herein by reference.

<sup>5</sup> A copy of this picture of the infringing Slim Stik product is also attached hereto as Exhibit D and incorporated herein by reference.

<sup>6</sup> A copy of this picture of the infringing Street Stik product is also attached hereto as Exhibit E and incorporated herein by reference.

31. As recited in Claim 5 of the '531 Patent, Defendant's Tap Out, Street Stik and Slim Stik products are "system[s] replacing linear fluorescent lamps with LED modules in a cabinet sign having raceways, said cabinet sign being previously constructed and arranged for mounting linear fluorescent lamps in sockets between the raceways." As seen from the Defendant's website, the infringing products are systems for replacing fluorescent lamps with LED modules. See Exhibit F hereto, which is incorporated herein by reference as if set forth verbatim.

32. Copies of pages from the "Features" section of the Defendant's Specification Sheets pertaining to its infringing Tap Out, Street Stik and Slim Stik products are attached hereto as Exhibits G, H and I. They state the following in reference to Defendant's infringing Tap Out, Street Stik and Slim Stik products, respectively: "Standard lengths available (18"-120")," "Available in all traditional T-12 lamp lengths from 8"-120" and fits directly into T-12 sockets," and "Available in all traditional T-12 lamp lengths from 8"-120". These statements are admissions that Defendant's products are "cut substantially to the length of a linear fluorescent lamp," as recited in Claim 5.

33. Upon information and belief, as recited in Claim 5, each of Defendant's Tap Out, Street Stik, and Slim Stik products include aspects connecting their extruded LED module support structure using one or more of: "c) an engagement of an end of said extruded hollow LED module support structure with one or both of the linear fluorescent lamp sockets"; or "a) at least one mounting tab constructed and arranged for attachment to one or both

raceways in the cabinet sign, said at least one mounting tab being formed on an end of said extruded hollow LED module support structure”; or “b) a three-sided connector constructed and arranged for attachment to one or both raceways in the cabinet sign, said three-sided connector enabling the position of said extruded hollow LED module support structure within said cabinet sign”.

34. Defendant had actual knowledge of Plaintiff’s RetroRayz products as early as January 2017. On information and belief, Defendant had actual knowledge of the ‘531 Patent upon its issuance.

35. By virtue of the foregoing, Defendant has directly and indirectly infringed, and continues to so infringe, one or more valid claims of the ‘531 Patent, including at least Claim 5, in violation of 35 U.S.C. § 271, either literally or under the doctrine of equivalents, by making, using, offering to sell, or selling an infringing product in the United States, importing an infringing product into the United States, or both.

36. In addition, Defendant, either alone or with others, has induced and continues inducing infringement of one or more valid claims of the ‘531 Patent, including at least Claim 5, by, among other things, actively and knowingly aiding and abetting others to directly make, use, offer for sale, sell, or import within this judicial district and elsewhere in the United States, without license or authority, products that fall within the claims of the ‘531 Patent, in violation of 35 U.S.C. § 271(b).

37. Defendant, alone or with others, has sold and will continue to sell products with the knowledge and intent that customers who buy the products

will commit infringement by using the products as they are intended and marketed to be used, thereby directly infringing the '531 Patent.

38. As demonstrated by Defendant's web site, Defendant's products as described and illustrated above have been offered for commercial sale and, on information and belief, sold by Defendant to direct and indirect customers.

39. By virtue of the foregoing facts, Defendant has contributorily infringed, and continues to so infringe, one or more of the '531 Patent's claims, including at least Claim 5, in violation of 35 U.S.C. § 271(c), by, among other things, selling, offering for sale, or importing into this judicial district and elsewhere in the United States, without license or authority, products or components of products that constitute a material part of the '531 Patent, knowing that such products and components are especially made or adapted for use in the infringement of the '531 Patent, including but not limited to Claim 5, and not staple articles of commerce suitable for substantial non-infringing use.

**V.  
REQUEST FOR RELIEF**

Wherefore, Plaintiff requests that Defendant be cited to appear and answer herein and that Plaintiff have judgment against Defendant:

- A. Finding that Defendant has infringed, directly or indirectly, one or more claims of the '531 Patent;
- B. Awarding Plaintiff all damages caused by such infringement, including lost profits, or in the alternative, not less than a reasonable royalty, in an amount adequate to compensate Plaintiff for Defendant's infringement of the '531 Patent;

- C. Finding that Defendant willfully infringed the '531 Patent and awarding damages equal to three times Plaintiff's actual damages under 35 U.S.C. § 284;
- D. Permanently enjoining Defendant from infringing the '531 Patent;
- E. In the alternative, if a permanent injunction is not granted, setting forth conditions for future infringement, such as an ongoing royalty;
- F. For a post-judgment equitable accounting of damages owed by Defendant for the period of infringement of the '531 Patent following the period of damages established at trial;
- G. Finding that this case is "exceptional" and awarding Plaintiff its attorneys' fees, expenses, and costs, pursuant to 35 U.S.C. § 285; and
- H. Any other and further relief as the Court may deem just and proper.

**DEMAND FOR JURY TRIAL**

Plaintiff demands a trial by jury on all issues so triable pursuant to Federal Rule of Civil Procedure 38.

Respectfully submitted,

/s/ Jonathan D. Pauerstein  
Jonathan D. Pauerstein  
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*Attorney for Plaintiff*

(12) **United States Patent**  
**Gorman et al.**

(10) **Patent No.:** **US 9,702,531 B2**  
(45) **Date of Patent:** **Jul. 11, 2017**

(54) **RETROFIT SYSTEM AND METHOD FOR REPLACING LINEAR FLUORESCENT LAMP WITH LED MODULES**

2131/405 (2013.01); F21Y 2103/10 (2016.08);  
F21Y 2115/10 (2016.08); Y02B 20/386  
(2013.01)

(71) Applicant: **General LED, Inc.**, San Antonio, TX (US)

(58) **Field of Classification Search**

CPC .. F21K 9/27; F21S 4/28; F21V 15/013; F21V 17/002; F21V 19/003; F21W 2131/405; F21Y 2103/10; F21Y 2115/10; Y02B 20/386

(72) Inventors: **Aaron Gorman**, New Braunfels, TX (US); **Gray Lankford**, San Antonio, TX (US)

See application file for complete search history.

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 171 days.

(56) **References Cited**

#### U.S. PATENT DOCUMENTS

6,871,983 B2 *	3/2005	Jacob .....	F21S 8/04 362/147
7,490,957 B2	2/2009	Leong et al.	
7,926,977 B2	4/2011	Nall et al.	
8,115,411 B2	2/2012	Shan	
8,474,998 B2	7/2013	Wang et al.	
8,791,650 B2	7/2014	Shan	
9,133,986 B2	9/2015	Wang et al.	
9,179,513 B2	11/2015	Shan	
9,228,727 B2 *	1/2016	May .....	F21S 8/04
2013/0094225 A1 *	4/2013	Leichner .....	F21S 2/005 362/368
2015/0184807 A1	7/2015	Vincent	
2015/0211688 A1	7/2015	Shan	

\* cited by examiner

(21) Appl. No.: **14/694,515**

(22) Filed: **Apr. 23, 2015**

(65) **Prior Publication Data**

US 2015/0308631 A1 Oct. 29, 2015

#### Related U.S. Application Data

(60) Provisional application No. 61/983,140, filed on Apr. 23, 2014, provisional application No. 62/099,722, filed on Jan. 5, 2015.

(51) **Int. Cl.**

**F21V 19/00** (2006.01)  
**F21V 15/01** (2006.01)  
**F21S 4/28** (2016.01)  
**F21K 9/27** (2016.01)  
**F21W 131/405** (2006.01)  
**F21V 17/00** (2006.01)  
**F21Y 103/10** (2016.01)  
**F21Y 115/10** (2016.01)

(52) **U.S. Cl.**

CPC ..... **F21V 19/003** (2013.01); **F21K 9/27** (2016.08); **F21S 4/28** (2016.01); **F21V 15/013** (2013.01); **F21V 17/002** (2013.01); **F21W**

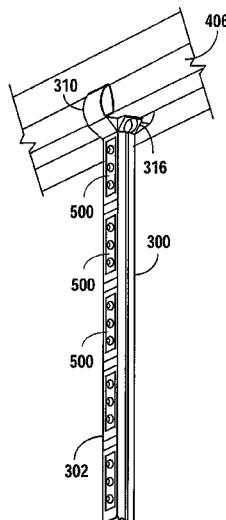
*Primary Examiner* — Stephen F Husar

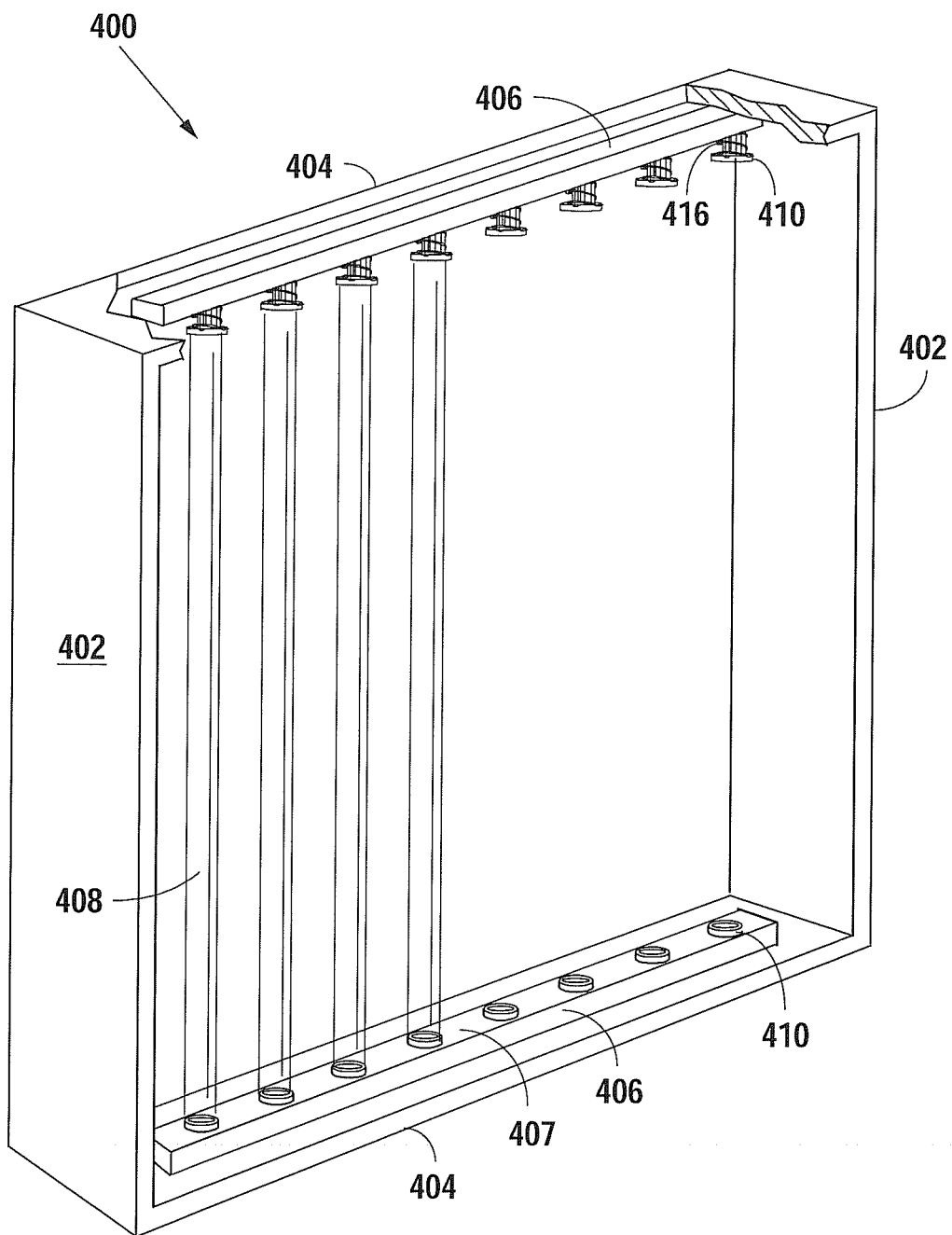
(74) *Attorney, Agent, or Firm* — William H. Quirk; Jesse Frizzell; Rosenthal Pauerstein Sandoloski Agather LLP

(57) **ABSTRACT**

A system for replacing linear fluorescent lamps with LED modules in a cabinet sign includes an LED module support structure. The LED module support structure may be attached to the raceways of the cabinet sign or to the sockets formerly used for mounting fluorescent lamps between the raceways.

**17 Claims, 14 Drawing Sheets**





*Fig. 1*  
(PRIOR ART)



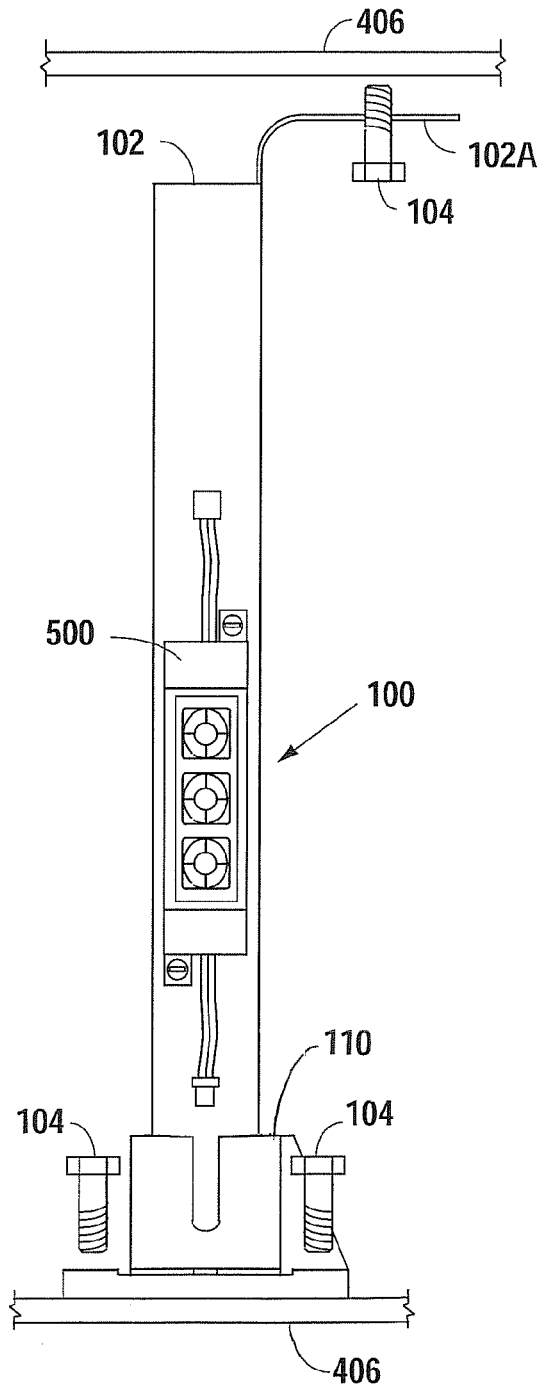


Fig. 2

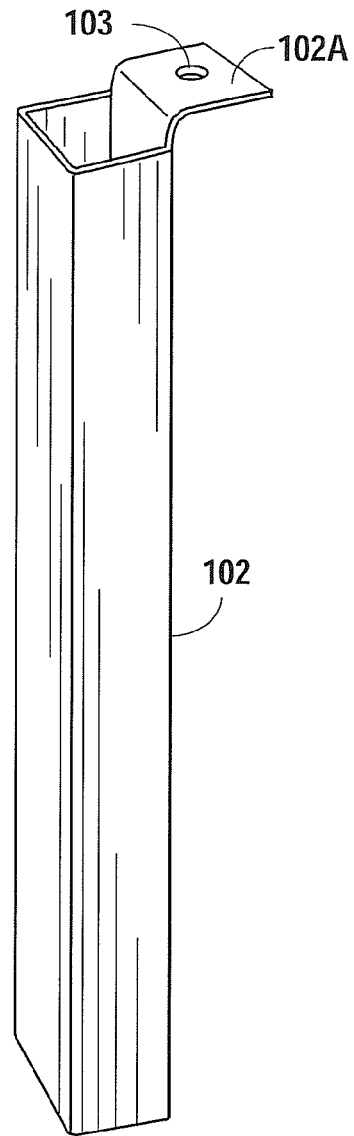


Fig. 2A

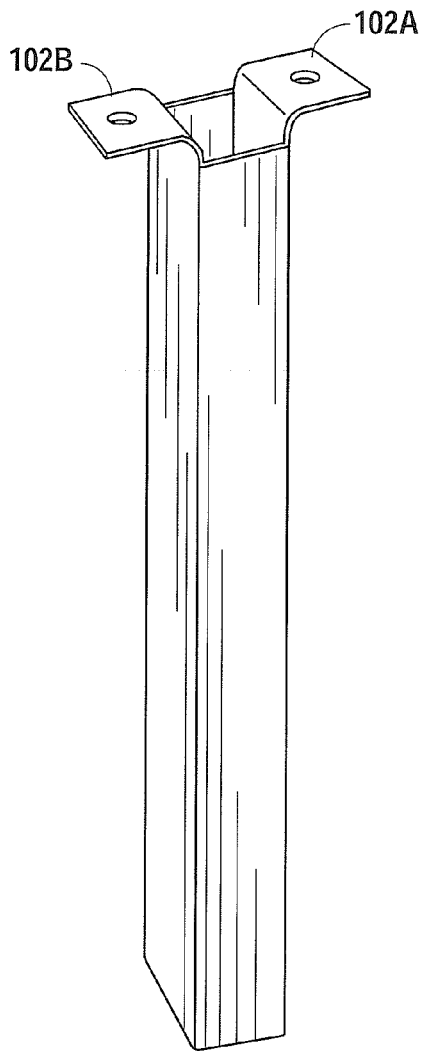


Fig. 2B

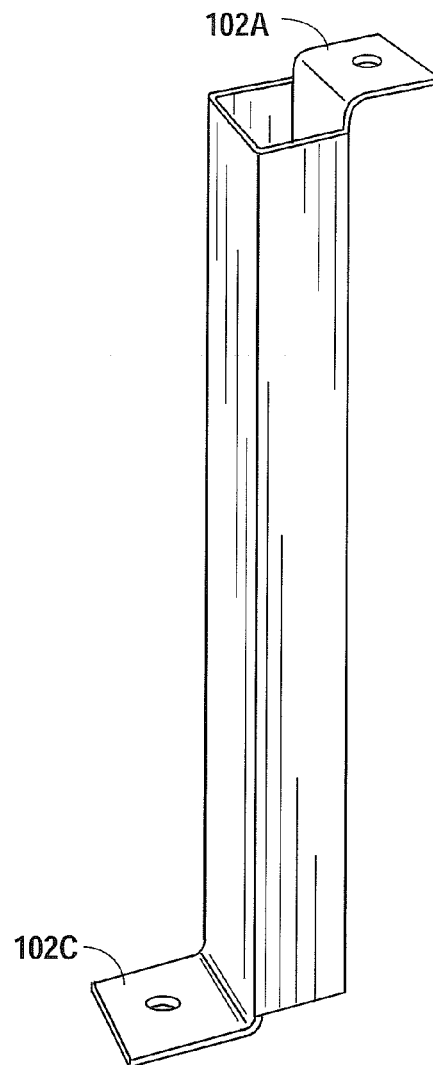


Fig. 2C

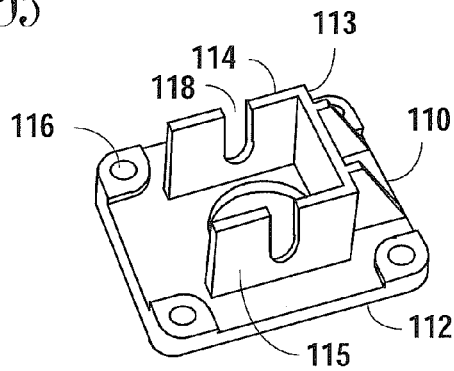
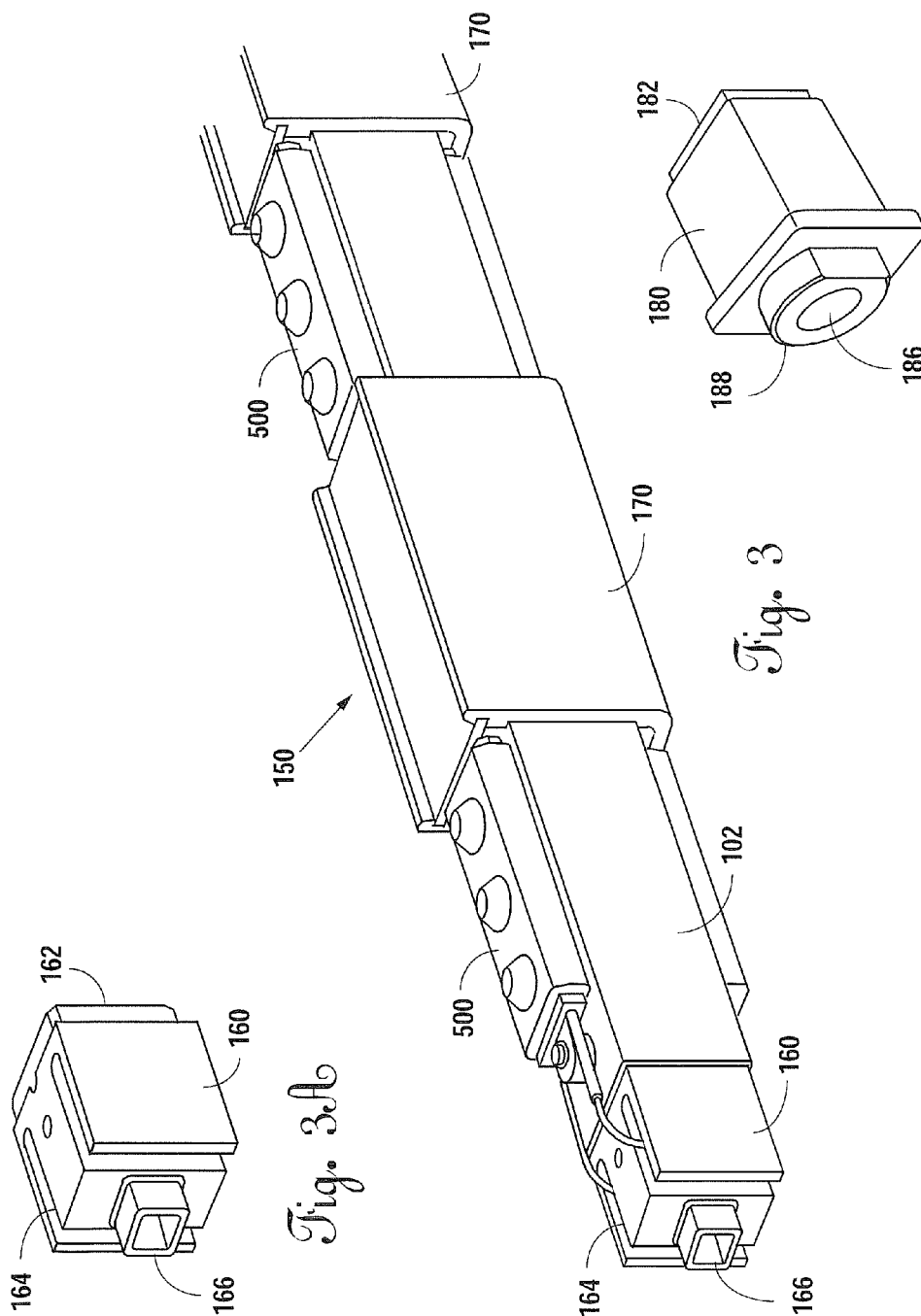


Fig. 2D



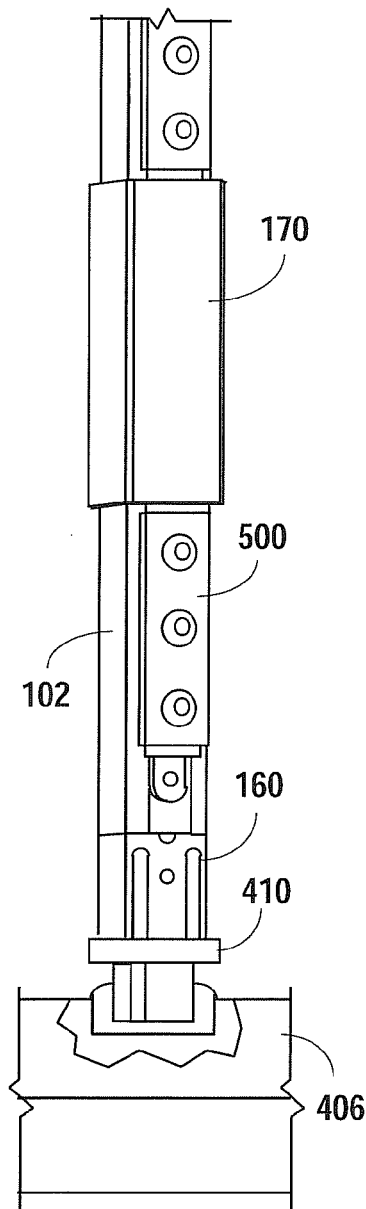


Fig. 4

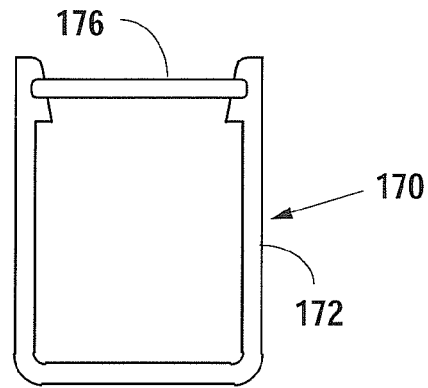


Fig. 5

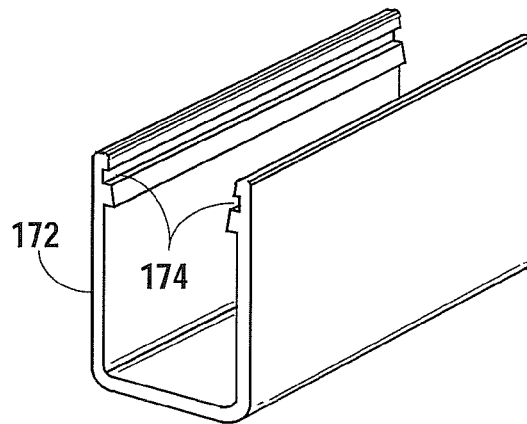


Fig. 5A

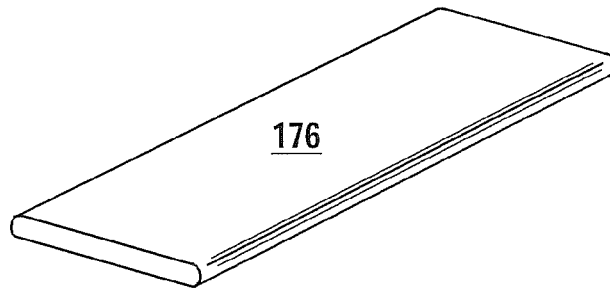
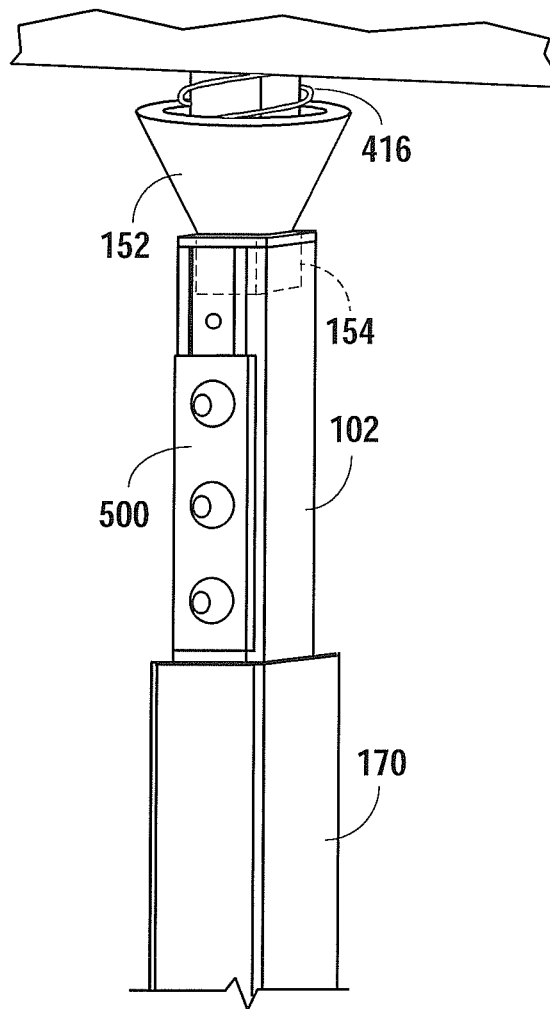
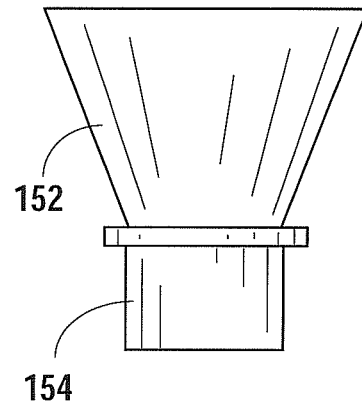


Fig. 5B



*Fig. 6*



*Fig. 6A*

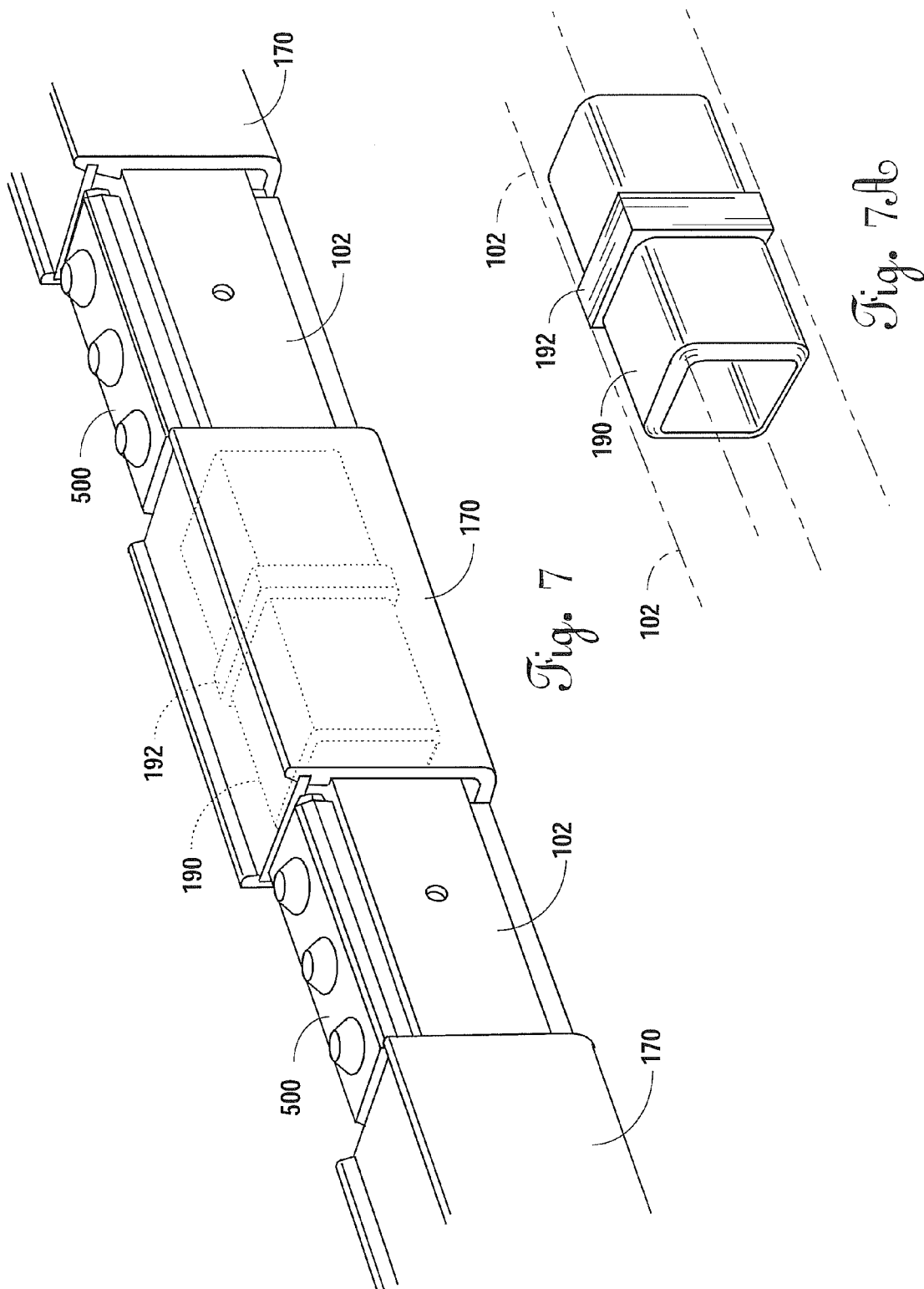


EXHIBIT "A"

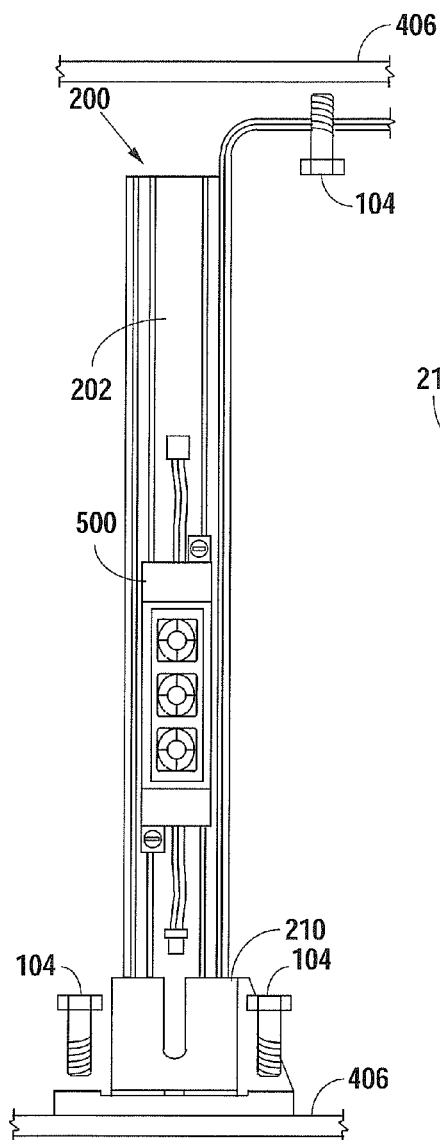


Fig. 8

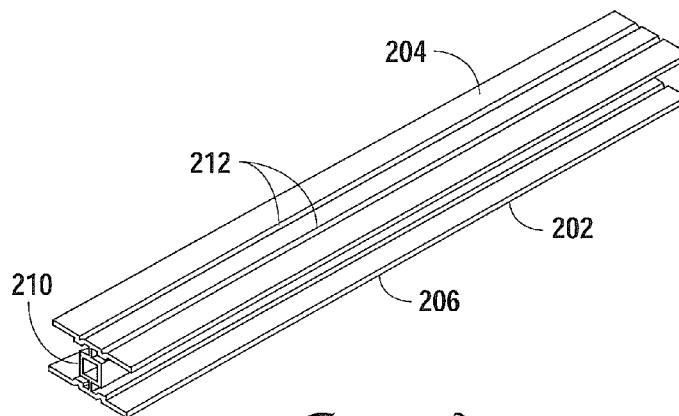


Fig. 8A

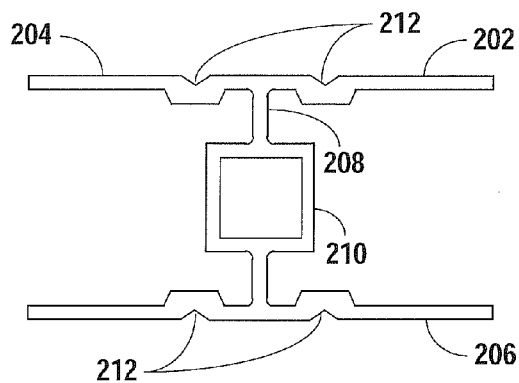
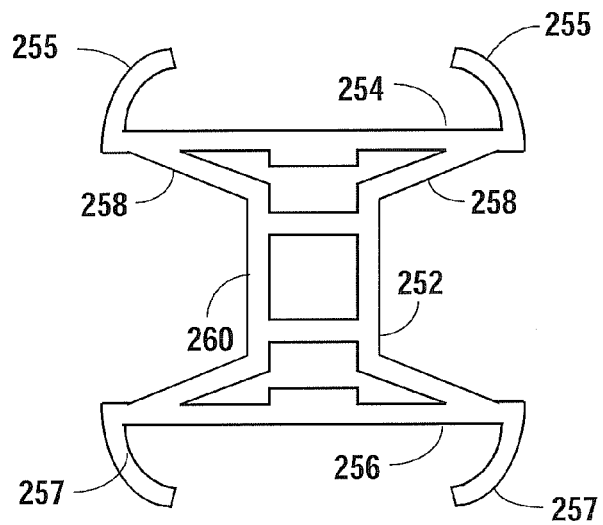
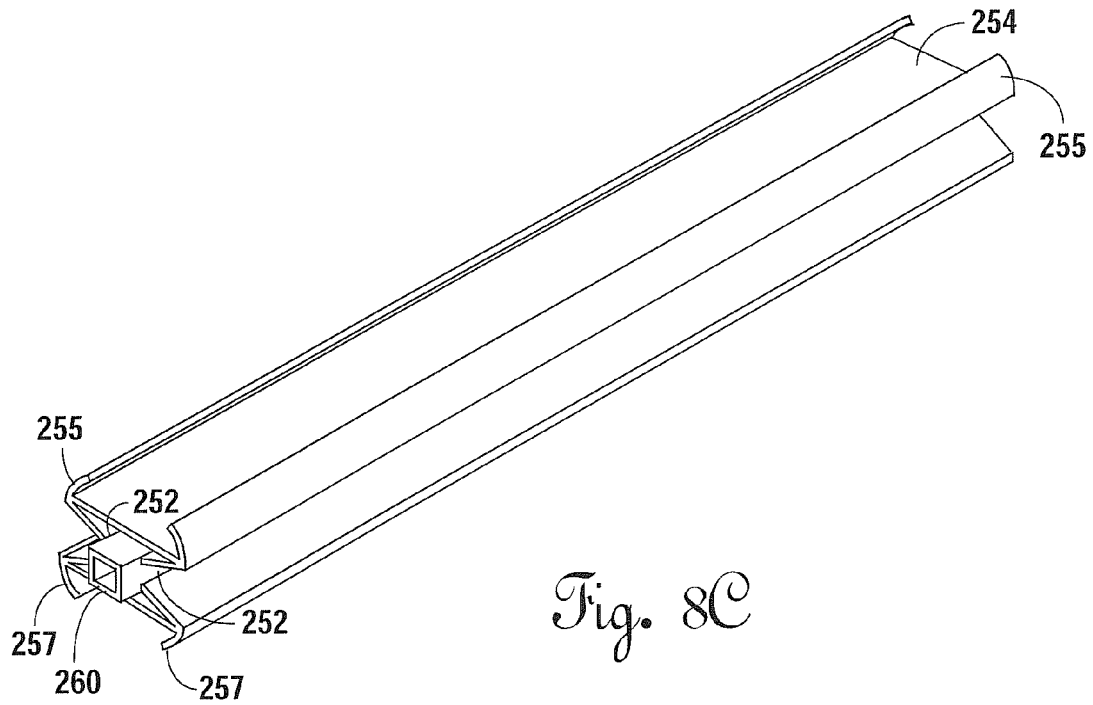


Fig. 8B





U.S. Patent

Jul. 11, 2017

Sheet 10 of 14

US 9,702,531 B2

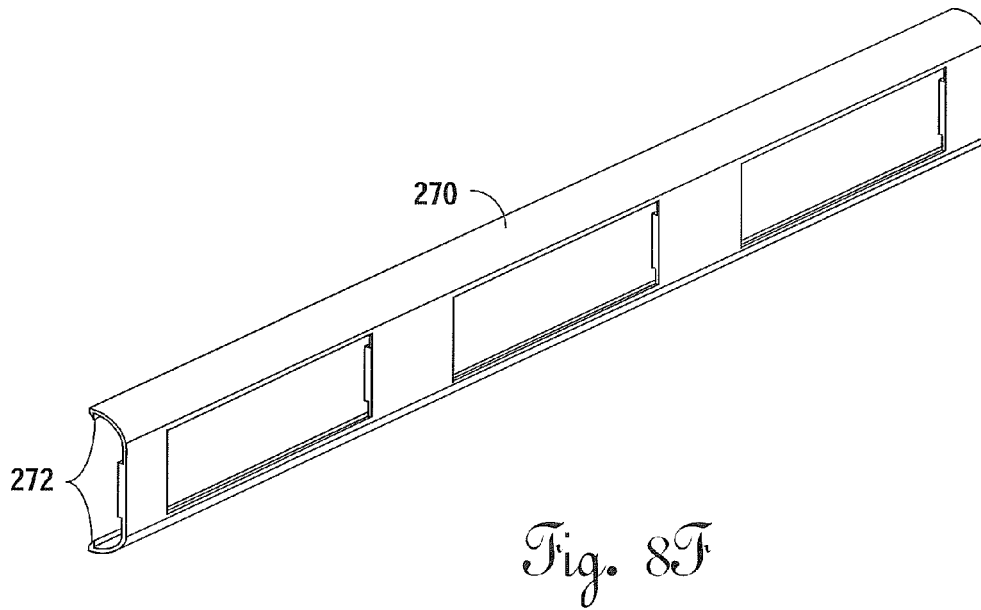
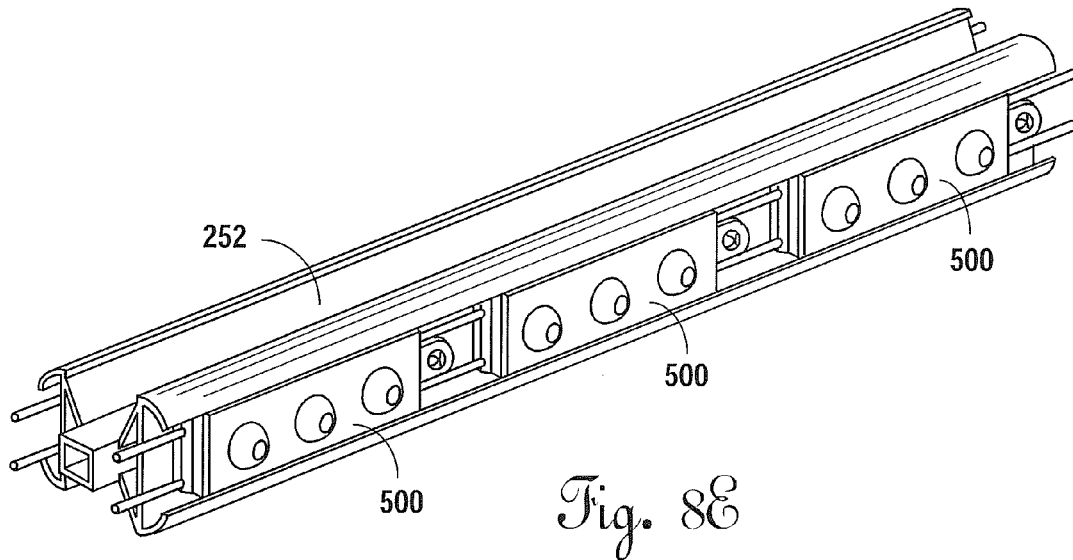


EXHIBIT "A"

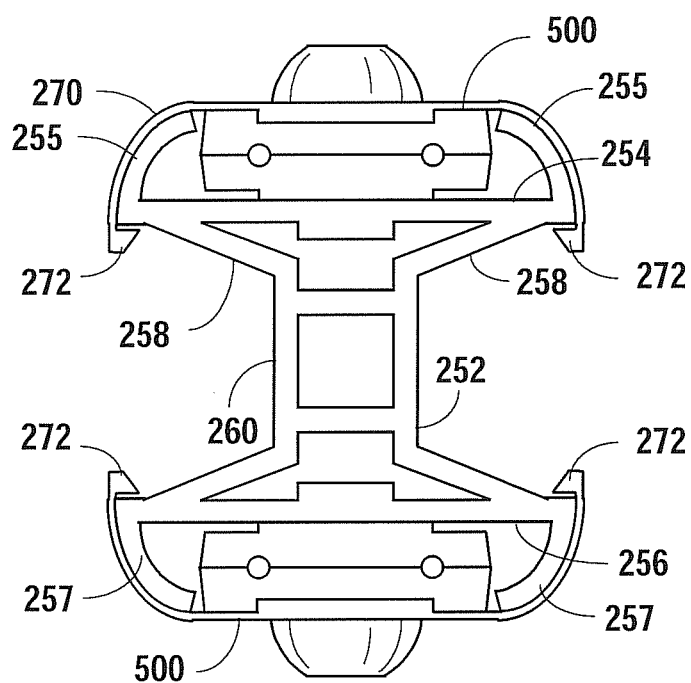


Fig. 8G

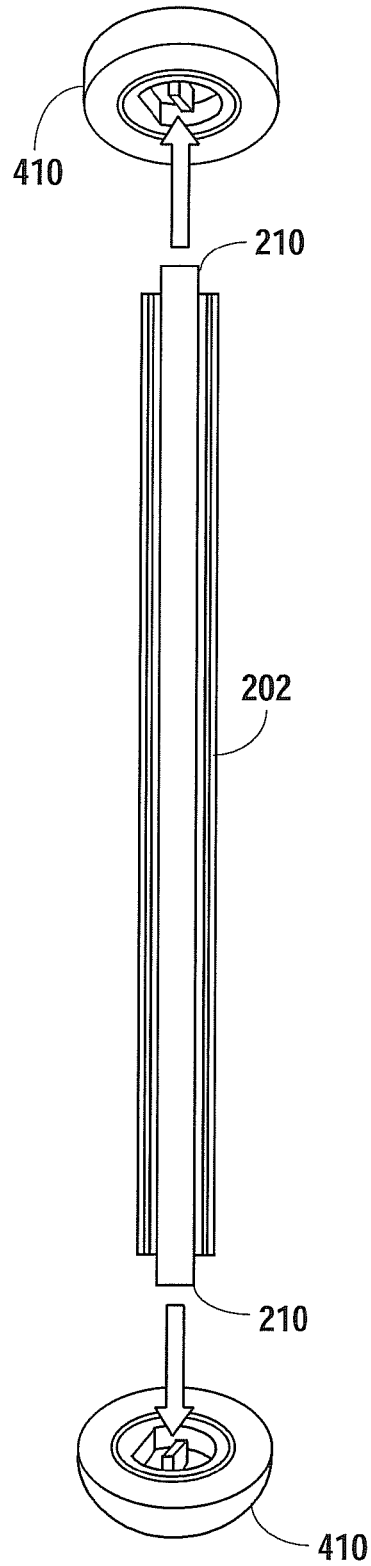


Fig. 9

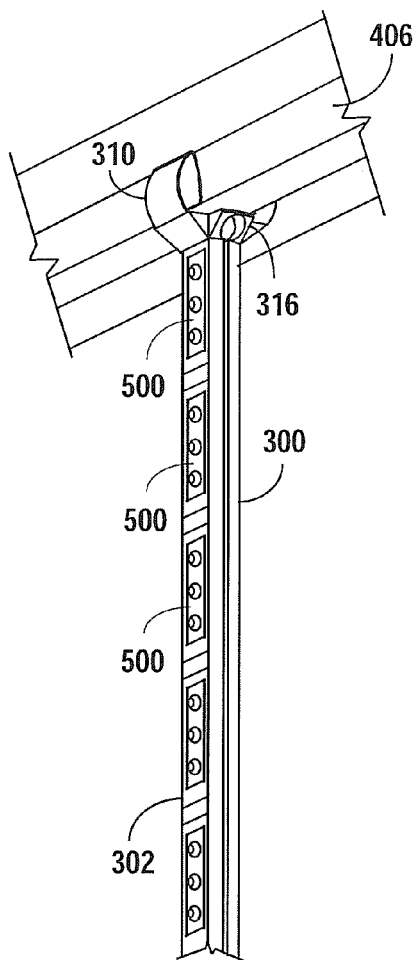


Fig. 10

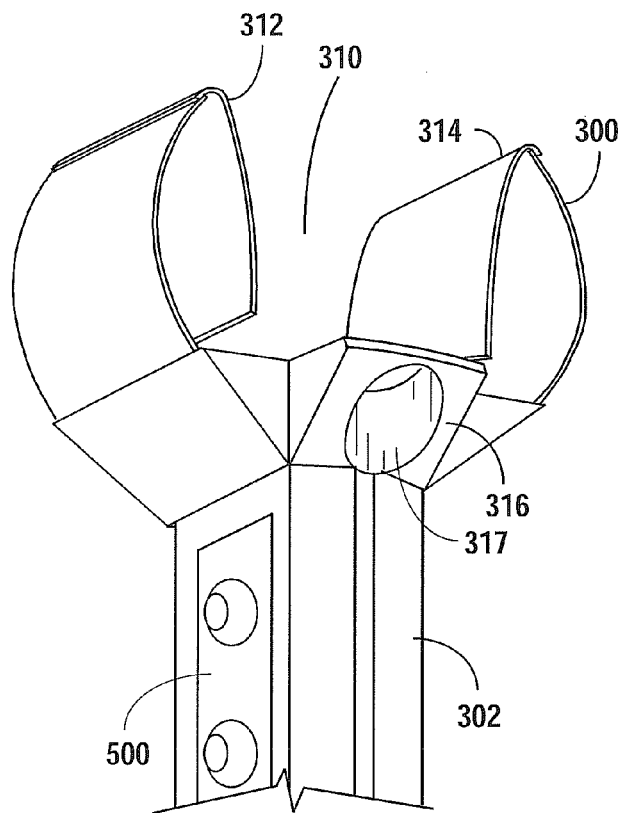


Fig. 11

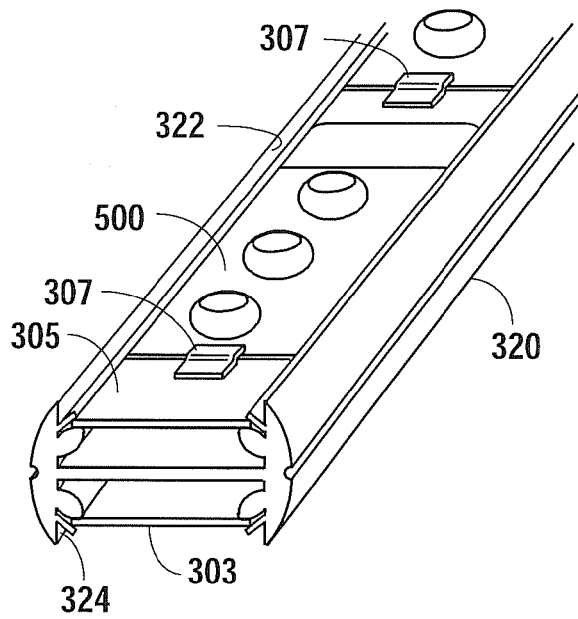


Fig. 12

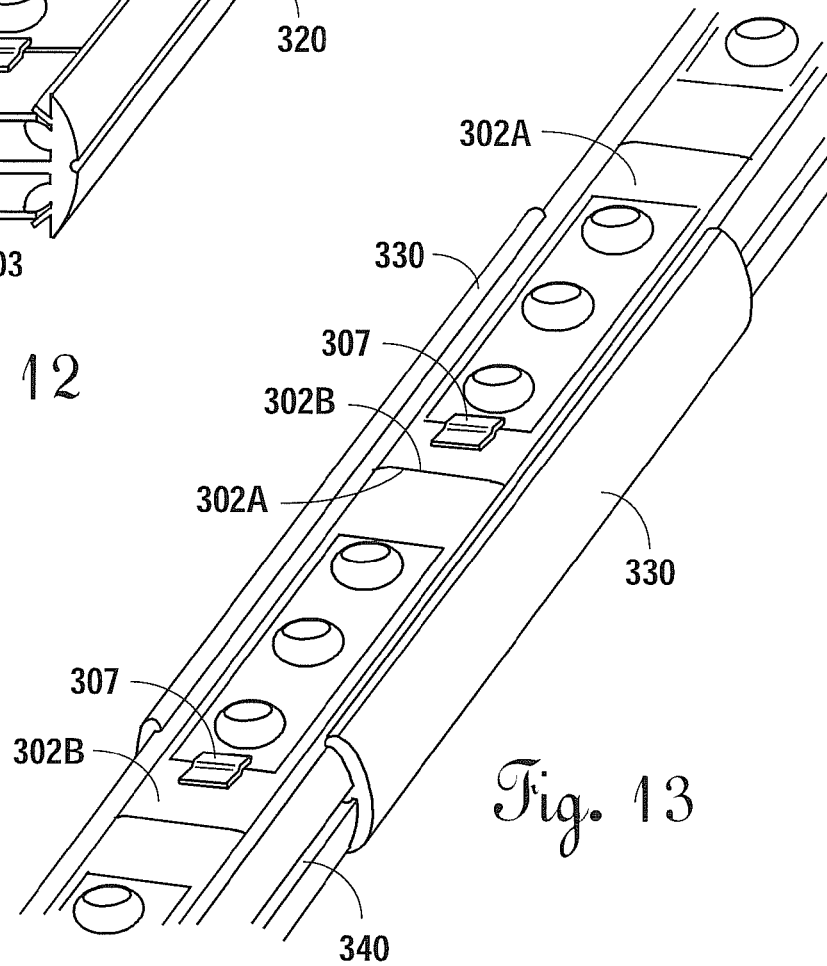


Fig. 13

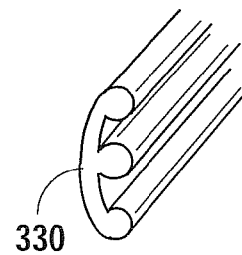


Fig. 13A

US 9,702,531 B2

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# RETROFIT SYSTEM AND METHOD FOR REPLACING LINEAR FLUORESCENT LAMP WITH LED MODULES

## CROSS REFERENCE TO RELATED PATENT APPLICATIONS

This application claims the benefit of Provisional U.S. Patent Application No. 61/983,140 filed Apr. 23, 2014 and Provisional U.S. Patent Application No. 62/099,722 filed Jan. 5, 2015.

## FIELD

The present invention pertains to the mounting of LED light systems; more particularly, the present invention pertains to systems and methods for replacing linear fluorescent lamps in cabinet signs with LED modules.

## BACKGROUND

Linear fluorescent lamps have been the light source of choice for commercial applications, to include signage, in the United States and other countries for much of the twentieth century. The many types of linear fluorescent lamps currently range from a nominal size of less than one foot to a nominal size of ten feet. Because of the many standard sizes of linear fluorescent lamps in commercial lighting, commercial signage is designed around the nominal length of the linear fluorescent lamps.

In commercial signage, linear fluorescent lamps are often mounted in a parallel fashion in what is known in the industry as cabinet signs. The structure of the interior of the prior art cabinet signs provides mounting points, typically the two fluorescent lamp sockets, between which each linear fluorescent lamp is placed. The two sockets both hold the linear fluorescent lamps in position and enable a female electrical connection to the prongs which extend outwardly from the ends of the linear fluorescent lamps. To accommodate small variations in the lengths of linear fluorescent lamps, one of the sockets, typically the socket at the top of the cabinet sign, includes a spring to assure that the linear fluorescent lamp is held in place and that a suitable electrical connection is established.

While it is generally cheaper to operate linear fluorescent lamps than the incandescent light bulbs that linear fluorescent lamps replaced, the continuing increases in the cost of electrical energy have resulted in the need for a source of light energy that is cheaper to operate and more reliable than linear fluorescent lamps.

Several decades ago LEDs became available as a lighting source. Initially, the low light output of LEDs limited their use to indicator lights typically used with electronic control systems. Since the initial introduction of LEDs their output of light energy has increased to where the light output of LEDs rivals the light output of both incandescent light bulbs and linear fluorescent lamps. In addition to being less expensive to operate than linear fluorescent lamps, LEDs have a much longer life; thus, the operational cost of LEDs per unit of time is much less than systems using conventional linear fluorescent lamps.

LEDs also provide other features not found in systems using linear fluorescent lamps. Those features include color and flexibility. Most linear fluorescent lamps emit white or off-white illumination. LEDs emit light in multiple colors. Further, LEDs are typically provided in modules, which LED modules are connected one to another by wires. Thus,

2

for commercial lighting designers, LEDs provide more flexibility and less cost over time.

Since fluorescent lighting has been around for more than half a century there are many cabinet signs designed for fluorescent lamps which are still serviceable and will remain serviceable for many years to come. Rather than building entirely new signage structures for the use of LED lights, the need has developed in commercial lighting applications for a system and method to replace linear fluorescent lamps with LED modules in existing prior art cabinet signs designed and built for the mounting of linear fluorescent lamps.

## SUMMARY

The disclosed system and method for replacing linear fluorescent lamps with LED modules in existing prior art cabinet signs designed and built for the mounting of linear fluorescent lamps in sockets between raceways includes an LED module support structure. The LED module support structure may be attached to the raceways within the prior art cabinet signs or to the fluorescent lamp sockets mounted in the raceways.

In one embodiment, the LED module support structure is a hollow extrusion which may be directly attached to the raceways within the prior art cabinet sign. In another embodiment, the hollow extrusion LED module support structure may be connected to the raceways within the prior art cabinet sign with a three sided connector. In yet another embodiment, the hollow extrusion LED module support structure is used to engage the sockets formerly used to support and provide electrical power to the linear fluorescent lamps.

In still another embodiment, the LED module support structure is an extrusion having a cross section including flanges, a single or double web therebetween and a central opening formed in the web. The extrusion may be directly attached to the raceways, connected to the raceways with a three sided connector or formed to engage one or both of the sockets formerly used to support and provide electrical power to the linear fluorescent lamps.

In still yet another embodiment the LED modules support structure is a pair of substantially flat strips positioned in a substantially H-shaped holder. One end of the pair of substantially flat strips is formed into a grappling yoke for frictional engagement with the sides of the raceway.

## BRIEF DESCRIPTION OF THE DRAWING FIGURES

A better understanding of the disclosed system for replacing linear fluorescent lamps in a cabinet sign may be had by reference to the drawing figures wherein:

FIG. 1 is a perspective view of a prior art cabinet sign designed for the use of linear fluorescent lamps as an illumination source;

FIG. 2 is a side elevational view of a first embodiment of the disclosed system;

FIG. 2A, FIG. 2B and FIG. 2C are perspective views of the extruded hollow LED module support structure showing mounting tabs formed on the ends thereof;

FIG. 2D is a perspective view of the three sided connector shown in FIG. 2;

FIG. 3 is a perspective view of the bottom of a second version of the first embodiment;

FIG. 3A is a perspective view of an adapter shown in FIG. 3;

EXHIBIT "A"

## US 9,702,531 B2

3

FIG. 3B is a perspective view of an alternate embodiment of the adapter shown in FIG. 3A;

FIG. 4 is a perspective view of the embodiment shown in FIG. 3 showing engagement with a fluorescent lamp socket;

FIG. 5 is a side elevational view of a wire cover which fits over the extruded hollow LED module support structure;

FIG. 5A is a perspective view of the U-shaped portion of the wire cover shown in FIG. 5;

FIG. 5B is a perspective view of the plate shown in FIG. 5;

FIG. 6 is a perspective view of the top of the embodiment shown in FIG. 3;

FIG. 6A is a side elevational view of the substantially hollow conical connector shown in FIG. 6;

FIG. 7 is a perspective view of the connection of two sections of the extruded hollow LED module support structure;

FIG. 7A is a perspective view of the block used in FIG. 7;

FIG. 8 is a side elevational view of the second embodiment of the disclosed system;

FIG. 8A is a perspective view of one version of the extruded hollow LED module support structure used in the second embodiment;

FIG. 8B is a cross sectional view of the extruded hollow LED module support structure shown in FIG. 8A;

FIG. 8C is a perspective view of a second version of an extruded hollow LED module support structure;

FIGS. 8D is a cross-sectional view of the extruded hollow LED module support structure shown in FIG. 8C;

FIG. 8E is a perspective view of LED modules mounted on the extruded hollow LED module support structure shown in FIG. 8C and 8D;

FIG. 8F is a perspective view of a cover which may be placed over the LED modules;

FIG. 8G is a cross sectional view similar to FIG. 8D with the cover snapped onto the extrusion over the LED module;

FIG. 9 is a side elevational view of the second embodiment with a portion of the flanges and web removed and placed between two fluorescent lamp sockets;

FIG. 10 is a perspective view of the third embodiment in connection with a raceway;

FIG. 11 is an enlarged view of the grappling yoke portion of the third embodiment;

FIG. 12 is a perspective view in partial section showing the LED module support structure;

FIG. 13 is a perspective view of two sections of the LED module support structure connected one to another; and

FIG. 13A is a perspective view of the extender shown in FIG. 13;

## DESCRIPTION OF THE EMBODIMENTS

A better understanding of the disclosed system and method may be had from an understanding of prior art cabinet signs in which linear fluorescent lamps provide illumination behind one or two translucent panels. The translucent panels are typically mounted in a frame whose dimensions are determined primarily by the length of the linear fluorescent lamps used in the prior art cabinet signs.

Shown in FIG. 1 is a perspective view of a prior art cabinet sign 400 with the translucent panels removed. Structurally, the illustrated cabinet sign 400 has two side walls 402 and two end walls 404 which hereinafter will both be described as end walls. In some prior art cabinet signs the linear fluorescent lamps are mounted substantially horizontally and in other prior art cabinet signs the linear fluorescent

4

lamps are mounted substantially vertically as shown by the four linear fluorescent lamps 408 on the left side of FIG. 1. Attached to the end walls 404 are raceways 406 which contain fluorescent lamp sockets 410.

The fluorescent lamp sockets 410 both physically mount and provide electrical energy to the linear fluorescent lamps 408. As shown in FIG. 1 the fluorescent lamp sockets 410 at the bottom of the cabinet sign 400 are affixed to the raceway 406. However, the fluorescent lamp sockets 410 in the raceway 406 at the top of the cabinet sign 400 include a movable, spring bias 416 mounting. This is because the lengths of all linear fluorescent lamps are not exactly the same and some movement must be provided for this variation in length.

As will be explained below, when converting a prior art cabinet sign 400, which was previously illuminated by linear fluorescent lamps, to a sign illuminated by LED modules, the raceways 406 will be left in place.

Shown in FIG. 2 is a first embodiment 100 of the disclosed system. Herein, both raceways 406 have been left in place. The main structural portion of the first embodiment is an extruded hollow LED module support structure 102 which is cut substantially to the length of the linear fluorescent tube that will be replaced. As shown in FIG. 2A, the extruded hollow LED module support structure 102 is preferably a substantially square extrusion; however, an extrusion having a rectangular cross section or a cross section in the shape of a parallelogram may also be used. The generic term used herein for the geometry of these cross sections is a parallelepiped. LED modules 500 are connected to the extruded hollow LED module support structure 102 as shown in FIG. 2.

Also shown in FIG. 2A is that three walls of the extruded hollow LED module support structure 102 may be removed to leave a mounting tab 102A. This mounting tab 102A is shown at the top of FIG. 2. Herein, a hole 103 is formed in the mounting tab 102 and a threaded fastener 104 can be used to secure the tab 102 to the raceway 406 of the cabinet sign 400 in that part 407 (FIG. 1) of the raceway 406 between the sets of fluorescent lamp sockets 410.

If desired, two mounting tabs 102A, 102B may be formed at the end of the extruded hollow LED module support structure 102 as shown in FIG. 2B. Alternatively, a mounting tab 102A, 102C may be formed at each end of the extruded hollow LED module support structure 102 as shown in FIG. 2C.

Shown in FIG. 2, the upper end of the extruded hollow LED module support structure 102 is connected to the raceway 406 of the cabinet sign 400 using a mounting tab 102A and a threaded fastener 104. The bottom of the extruded hollow LED module support structure 102 may be positioned on top of the raceway 406 with a three-sided connector 110 as shown in FIG. 2D. The three-sided connector 110 is attached to the top of the raceway 406 with threaded fasteners which pass through holes 116 formed in the base portion 112 of the three-sided connector 110. Slots 118 in two sides 114, 115 of the three sides 113, 114, 115 of three-sided connector 110 enable securing the extruded hollow LED module support structure 102 to the three-sided connector 110 with a threaded fastener if desired.

Shown in FIG. 3 is a second version 150 of the first embodiment 100 using a substantially square hollow extrusion 102. As indicated above, the raceway 406 and the fluorescent lamp sockets 410 contained therein may be left in the cabinet sign 400. The second version 150 of the first embodiment 100 connect to the interior portion of the fluorescent lamp sockets 410 which remain in the raceway



US 9,702,531 B2

5

406 to engage the extruded hollow LED module support structure 102 as shown in FIG. 4.

As in the first version of the first embodiment 100, the main structural portion is a substantially square extruded hollow LED module support structure 102. As shown in FIG. 3, at the bottom end is an adapter 160 having a portion 162 which fits into the hollow portion of the extruded hollow LED module support structure 102, as shown in FIG. 3A. At the other end of the adapter 160 is a substantially rectangular opening 166. This substantially rectangular opening 166 is sized to fit around the protrusion found in the center of fluorescent lamp sockets 410. Along the sides of the adapter 160 shown in FIG. 3A are wire channels 164 for the wires which provide electrical energy to the LED modules 500 mounted on the sides of the extruded hollow LED module support structure 102. The engagement of the adapter 160 shown in FIG. 3A with the interior of the fluorescent lamp socket 410 is shown in FIG. 4.

Shown in FIG. 3B is an alternate shape for the adapter 180 which may be used to fit into the hollow portion of hollow LED module support structure 102. Like the adapter 160 shown in FIG. 3A, there is a portion 182 which engages the hollow portion of the hollow LED module support structure 102. On the opposite end is an opening 186 to accommodate the protrusion found in the interior of a fluorescent lamp socket 410. Surrounding the opening 186 is a substantially D-shaped form 188 which may be used to fit within the D-shaped found in the interior of some fluorescent lamp sockets 410.

Also shown in second version 150 of the first embodiment 100 in FIG. 3 is a sleeve assembly 170 which both covers the wires extending between the LED modules 500 and holds the LED modules 500 to the extruded hollow LED module support structure 102. The construction of this sleeve assembly 170 is shown in FIG. 5. Surrounding three sides of the extruded hollow LED module support structure 102 is a substantially U-shaped portion 172. Shown in FIG. 5A are the channels 174 formed on the top portion of the substantially U-shaped portion 172. These channels 174 enable the plate 176 shown in FIG. 5B to slide therein to cover the wires between the LED modules 500.

The top end of the second version 150 of the first embodiment 100 is shown in FIG. 6. Therein a substantially hollow cone 152 is used to contact the outer portion of the fluorescent lamp socket 410. The substantially hollow cone 152 is connected to the extruded hollow LED module support structure 102 in the same way as the adapters 160 shown in FIG. 3A and FIG. 3B. Specifically, a block portion 154, as shown in FIG. 6A, is inserted into the hollow portion of the extruded hollow LED module support structure 102.

Those of ordinary skill in the art will understand that the extruded LED module support structure 102 may be attached to the raceways 406 using mounting tabs, or a three sided connector 110 such as shown in FIG. 2D. Alternatively, the extruded hollow LED module support structure 102 may engage the interior of a fluorescent lamp socket 410 using an adapter 160 as shown in FIG. 3A or adapter 180 as shown in FIG. 3B. Also, the extruded hollow module support structure 102 may engage the exterior of a fluorescent lamp socket using a hollow cone 152 as shown in FIG. 6A.

In some prior art cabinet signs, an extremely long linear fluorescent lamp may have been used. Herein it may be necessary to use to multiple sections of the extruded hollow LED module support structure 102. If so, a structure as shown in FIG. 7 is employed. Inserted into the hollow portion of each section of the extruded hollow LED module

6

support structures 102 is a block 190 as shown in FIG. 7A. In the center section of the block 190 is central portion 192 whose outside perimeter substantially matches the outside perimeter of the extruded hollow LED module support structure 102. For additional strength, it has been found that the sleeve assembly 170, shown in FIG. 5, may be placed around each end of the extruded hollow LED module support structure 102 sections and the block 190 therebetween.

The second embodiment 200 of the disclosed system shown in FIG. 8 is similar to the first embodiment of the disclosed system shown in FIG. 2 but for the cross section of the extruded hollow LED module support structure 102 which is a substantially square or rectangular extrusion in the first embodiment 100.

The cross section of the extruded hollow LED module support structure 202 in the second embodiment 200 is that of a modified I-beam as shown in FIG. 8A and FIG. 8B which is cut substantially to the length of a linear fluorescent tube. Specifically, the modified I-beam includes a top flange 204, a bottom flange 206 and a web 208 therebetween. Formed in the web 208 is a substantially square central opening 210 that is large enough to encircle the protrusion in the middle of the interior of a fluorescent lamp socket 410. If desired, substantially V-shaped channels 212 may be formed on the outer sides of the top flange 204 and the bottom flange 206 for facilitating the drilling of holes or the insertion of self-threading fasteners.

Those of ordinary skill in the art will understand that ends of the extruded hollow LED module support structure 202 will enable the formation of mounting tabs 102A, 102B, and 102C as shown above in FIGS. 2, 2A, 2B and 2C by removing the structure between the flanges 204 and 206. Alternatively, the extruded hollow LED module support structure 202 may be attached to the raceway 406 using a three sided connector 110 as shown in FIG. 2D. And, the extruded hollow LED module support structure 202 may engage the interior of the fluorescent lamp socket 410.

Shown in FIG. 8C is a perspective view of a second version of the extruded hollow LED module support structure 252 used in the second embodiment. A cross section appears in FIG. 8D. Herein the extruded LED module includes a top flange 254, a bottom flange 256 and a double web 258 therebetween. Formed in the double web 258 is a substantially square central opening 260 that is large enough to encircle the protrusion in the middle of the interior of the fluorescent lamp socket 410. On either side 257 of the top flange 254 are quarter-arc LED module guides 255 for locating the LED module 500 on the top flange 254. Similar quarter-arc LED module guides 257 appear on either side of the bottom flange 256.

Shown in FIG. 8E is a plurality of LED modules 500 mounted to the flanges 254, 256 extruded hollow module support structure 252 using threaded fasteners or adhesives. As will be understood by those of ordinary skill in the art, the LED modules 500 are electrically connected one to another with wires.

Shown in FIG. 8F is an optional custom cover extrusion 270 which may be placed over the extruded hollow LED module support structure 202 as shown in FIG. 8G. The optional custom cover extrusion 270 may be used to hold the LED modules 500 in place and cover the wires between the LED modules 500. The optional custom cover extrusions 270 is held in place by a snapfit 272 including a tab which snaps over the end of the flanges 254, 256 and comes to rest on the underside of the flanges 254 and 256.

EXHIBIT "A"



US 9,702,531 B2

7

When the extruded hollow LED module support structure **202, 252** is to be mounted to the raceway **406** of the prior art cabinet sign **400**, as shown in FIG. **8**, the mounting is similar to the mounting of the first embodiment **100**. That is a top mounting tab and a bottom mounting using a three sided connector **110**, as shown in FIG. **8** may be used.

The presence of the substantially square central opening **210, 260** in the extruded hollow LED module support structure **202, 252** enables the extension of the substantially square central opening **210, 260** at the end of modified I-beam extruded hollow LED module support structure **220** by removing portions of the flanges **204, 206, 254, 256** and a portion of the web **210, 260** as shown in FIG. **9**. This substantially square central opening **210** may be used to encircle the protrusion in the interior of the fluorescent lamp socket **410**. Thus, the ends of the extruded hollow LED module support structure **202, 252** may be affixed to a portion of **407** (FIG. **1**) of the raceway **406**. Alternatively, the LED module support structure **202, 252** may be supported on either end by engagement with a fluorescent lamp socket **410** in the raceway **406**.

As shown in FIG. **9**, both ends of the modified I-beam extruded hollow LED module support structure **220** may be inserted into the interior of the fluorescent lamp sockets **410** if the installer elects to use the fluorescent lamp sockets **410** in the raceways **406** in the prior art cabinet sign **400**.

In the third embodiment **300**, shown in FIG. **10**, yet another way of attaching an LED module support structure **302** to a raceway **406** is shown. As shown in FIG. **11**, at the end of the LED module support structure **302** is a grappling yoke structure **310** which contacts the sides of the raceway **406** and is secured thereto with an overmolded plastic connector **316**. A mounting hole **317** for use with a threaded fastener is formed on either side of the overmolded plastic connector **316**.

As shown in FIG. **11**, the grappling yoke structure **310** includes high coefficient of friction rubber pads **312, 314** which are mounted to that part of the grappling yoke structure **310** which contacts the sides of the raceway **406** as shown in FIG. **10**. The grappling yoke structure **310** is designed so that it tends to close toward the raceway **406** when a downward force is placed on the LED module support structure **302**.

As shown in FIG. **12**, strips **303, 305** shown in FIG. **11** are inserted into the opening **322, 324** of a substantially H-shaped connector **320** and held in place by pairs of protrusions formed in the sides of the substantially H-shaped connector **320**. The LED modules may be attached to the strips **303, 305**, using clips **307**. The combination of the two formed strips **322, 324** and the substantially H-shaped connector **320** may be formed into sections **302A, 302B**.

As shown in FIG. **13**, these sections **302A, 302B** may be connected to one another using extenders **330**. The extenders **330** as shown in FIG. **13A** are formed to include a substantially circular protrusion **331** which engages a channel **340** formed in the outside of the substantially H-shaped connectors **330**.

The bottom of the LED module support structure **302** may be attached to the raceway **406** by forming mounting tabs **102A, 102B** and **102C** such as those shown in FIGS. **2, 2A, 2B** and **2C**.

While the disclosed retrofit system and method for replacing linear fluorescent lamps with a LED, modules have been disclosed according to preferred and alternate embodiments, those of ordinary skill in the art will understand that still other embodiments have been enabled according to the

8

foregoing disclosure. Such other embodiments shall fall within the scope and meaning of the appended claims.

What is claimed is:

1. A system for replacing linear fluorescent lamps with LED modules in a cabinet sign having raceways, said cabinet sign being previously constructed and arranged for mounting linear fluorescent lamps in sockets between the raceways, said system comprising:

an extruded hollow LED module support structure cut substantially to the length of a linear fluorescent lamp; connecting said extruded hollow LED module support structure to the raceway using one or more of the following:

- a) at least one mounting tab constructed and arranged for attachment to one or both raceways in the cabinet sign, said at least one mounting tab being formed on an end of said extruded hollow LED module support structure;
- b) a three sided connector constructed and arranged for attachment to one or both raceways in the cabinet sign, said three sided connector enabling the positioning of said extruded hollow LED module support structure within said cabinet sign; and
- c) an adapter constructed and arranged to fit within the hollow portion of said extruded hollow LED module structure on one end and engage one or both sockets for the linear fluorescent lamp on the other end.

2. The system as defined in claim 1 wherein the cross section of said extruded hollow LED module support structure is a parallelepiped.

3. The system as defined in claim 2 further including a substantially U-shaped sleeve constructed and arranged to fit around said extruded hollow LED module support structure and a plate interfitted therewith to surround said hollow LED module support structure and to cover the wires running between the LED modules.

4. The system as defined in claim 2 wherein said extruded hollow module support structure is formed in multiple sections which are connected to one another using a block which fits within the hollow portion of said hollow LED module support structure.

5. A system for replacing linear fluorescent lamps with LED modules in a cabinet sign having raceways, said cabinet sign being previously constructed and arranged for mounting linear fluorescent lamps in sockets between the raceways, said system comprising:

an extruded hollow LED module support structure cut substantially to the length of a linear fluorescent lamp; connecting said extruded LED module support structure using one or more the following:

- a) at least one mounting tab constructed and arranged for attachment to one or both raceways in the cabinet sign, said at least one mounting tab being formed on an end of said extruded hollow LED module support structure;
- b) a three-sided connector constructed and arranged for attachment to one or both raceways in the cabinet sign, said three-sided connector enabling the position of said extruded hollow LED module support structure within said cabinet sign; and
- c) an engagement of an end of said extruded hollow LED module support structure with one or both of the linear fluorescent lamp sockets.

6. The system as defined in claim 5 wherein the cross section of said extruded hollow LED module mounting structure is a beam including two opposing outer flanges, a web formed therebetween and a hollow central opening formed in said web.

EXHIBIT "A"

## US 9,702,531 B2

9

7. The system as defined in claim 5 wherein the cross section of said extruded hollow LED module mounting structure is a beam including two opposing outer flanges, a double web formed therebetween and a hollow central opening formed in said double web.

8. The system as defined in claim 7 wherein quarter-arc portions are formed on the outer edges of said opposing outer flanges to enable locating an LED module therebetween.

9. The system as defined in claim 8 further including a cover portion constructed and arranged for a snapfit engagement with said opposing flanges.

10. The system as defined in claim 5 wherein the engagement of an end of said extruded hollow LED support structure is with the interior of the linear fluorescent lamp socket.

11. The system as defined in claim 5 wherein the engagement of an end of said extruded hollow LED support structure is with the exterior of the linear fluorescent lamp socket.

12. The system as defined in claim 11 wherein the engagement of the exterior of said fluorescent lamp socket by an end of said extruded hollow LED support structure includes a hollow cone.

13. A system for replacing linear fluorescent lamps in a cabinet sign, said cabinet sign being previously constructed

10

and arranged for mounting linear fluorescent lamps between raceways, said system comprising:

an LED module support structure having a pair of strips cut substantially to the length of a linear fluorescent lamp, said pair of strips being positioned with respect to another by placement within the openings in a substantially H-shaped holder;

wherein a spring biased grappling yoke is placed on one end of said pair of strips, said spring biased grappling yoke constructed and arranged to grasp the raceway.

14. The system as defined in claim 13 wherein each side of said spring biased grappling yoke includes a high friction covering.

15. The system as defined in claim 13 further including a plastic retaining piece overmolded over said pairs of strips, said plastic retaining piece including holes formed therein to enable connection of said plastic retaining piece to the raceway with threaded fasteners.

16. The system as defined in claim 13 further including connectors engageable with said H-shaped holder to extend the length of said LED module support structure.

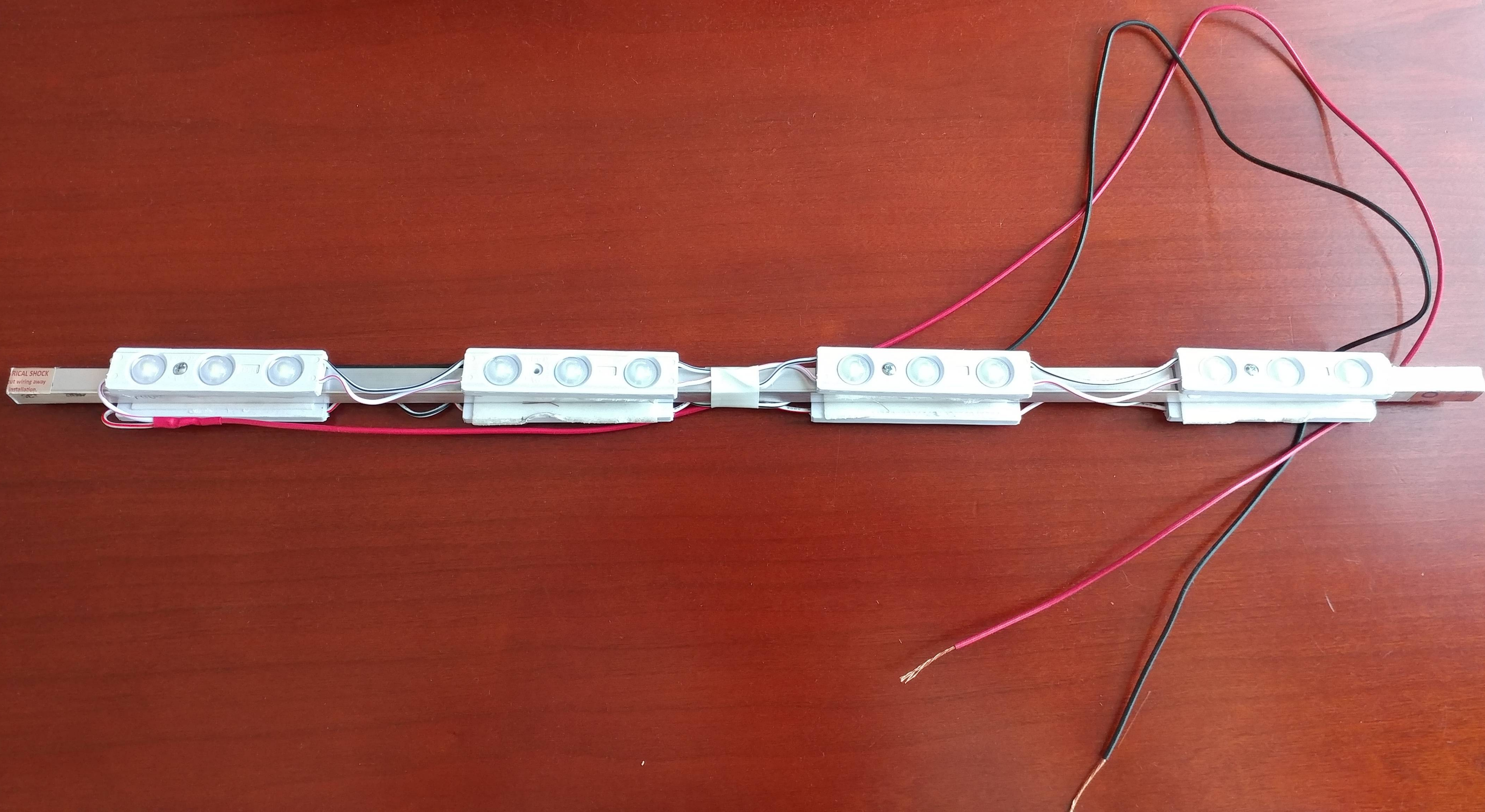
17. The system as defined in claim 13 wherein the connection of the end of said strips opposite from said grappling yoke includes a tab formed on at least one of the pair of strips constructed and arranged for attachment to a raceway in the cabinet sign.

\* \* \* \* \*



EXHIBIT "B"







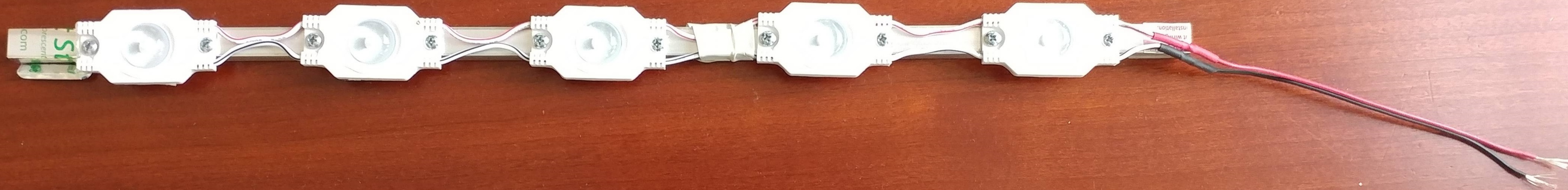






EXHIBIT "E"



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# PRINCIPAL LED

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## Street Fighter Series

## TAP OUT STIK™ SERIES

*Closing the price gap between LEDs and Fluorescents!*

## SPECIFICATIONS

Beam Angle	160° Low Dome, Batwing Optic	
Certifications	UL & cUL Recognized (SAM Manual), CE, RoHs	
Dimensions	Single-Sided	.71"W x .75"H x Length
	Double-Sided	.71"W x 1.1"H x Length
Efficacy	True White	95 LM/W
Fastening	Socket (retro) / Brackets (new)	
Input	12VDC	
Intensity	See Product Options	
Max Mods (Series)	N/A	
Operating Temp	-40° to +60°C	
Packaging	Single-Sided	10 pieces per tube
	Double-Sided	8 pieces per tube
Power	See Product Options	
Power Supply	P-LED 12VDC	
Protection Grade	IP67	
Run Footage	N/A	
Spacing	N/A	
Warranty	5 Year Product / 5 Year Limited Labor	

## FEATURES

- The most cost effective retrofit system on the market
- Fastest payback on the market
- All Tap Out™ Stiks come with 6' whips for easy installation
- Comes in standard color temperature
- Batwing optic lens for even illumination at all cabinet depths (12"-30" Double-Sided)
- Standard lengths available (18"-120")
- Two mounting options:
  - Fits into existing sockets for retros
  - New Construction Mounting Brackets

## WIRING DETAILS

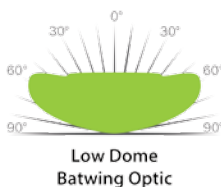
White/Red	Positive
White/Black	Negative

## RECOMMENDED COVERAGE CHART

Depth from Stik to Face	Estimated Spacing between Stiks
5"	10"
6"	12"
7" – 8"	16"
9" – 12"	18"

&gt;12 (Use two banks Single-Sided)

Note: Product and depth may vary depending on face material and desired brightness.

TAP  
OUT

UL  
E341517

CLASSIFIED  
UL

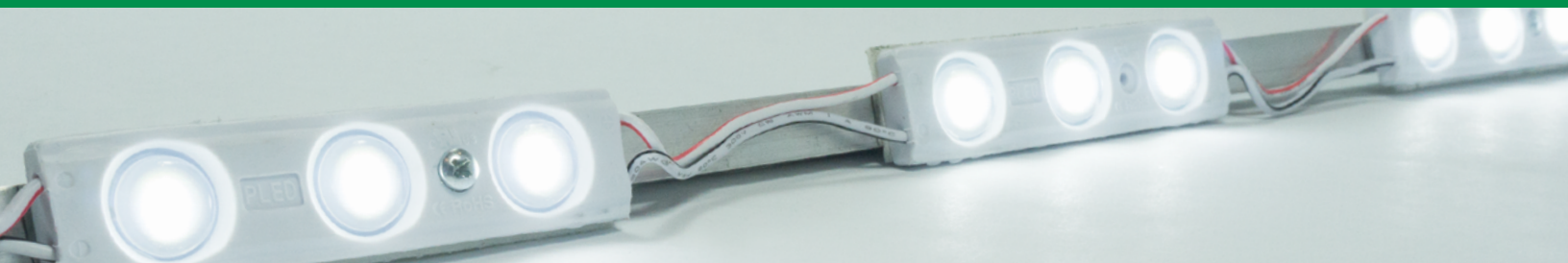
RoHs  
COMPLIANT

CE

LM79

LM80





## Tap Out Stik Single-Sided™

### PRODUCT OPTIONS

T-12	Actual Length	Lumens per Stik	No. of Mods	Watts	Max. Units (60W)	Max. Units (120W)	Whips	Part Number
18"	15.91"	500	4	5.28	11	22	1-3 ft.	PL-OP2-TO3-P/ST-SS-18-TW
24"	21.91"	500	4	5.28	11	22	1-3 ft.	PL-OP2-TO3-P/ST-SS-24-TW
30"	27.91"	750	6	7.92	7	14	1-3 ft.	PL-OP2-TO3-P/ST-SS-30-TW
36"	33.91"	875	7	9.24	6	12	1-3 ft.	PL-OP2-TO3-P/ST-SS-36-TW
42"	39.91"	1,000	8	10.56	5	10	1-3 ft.	PL-OP2-TO3-P/ST-SS-42-TW
48"	45.91"	1,125	9	11.88	5	10	1-3 ft.	PL-OP2-TO3-P/ST-SS-48-TW
60"	57.91"	1,500	12	15.84	3	6	1-3 ft.	PL-OP2-TO3-P/ST-SS-60-TW
64"	61.91"	1,500	12	15.84	3	6	1-3 ft.	PL-OP2-TO3-P/ST-SS-64-TW
72"	69.91"	1,625	13	17.16	3	6	1-6 ft.	PL-OP2-TO3-P/ST-SS-72-TW
84"	81.91"	2,000	16	21.12	2	4	1-6 ft.	PL-OP2-TO3-P/ST-SS-84-TW
96"	93.91"	2,250	18	23.76	2	4	1-6 ft.	PL-OP2-TO3-P/ST-SS-96-TW
108"	105.91"	2,500	20	26.4	2	4	1-6 ft.	PL-OP2-TO3-P/ST-SS-108-TW
117"	114.91"	2,625	21	27.72	2	4	1-6 ft.	PL-OP2-TO3-P/ST-SS-117-TW
120"	117.91"	2,750	22	29.04	2	4	1-6 ft.	PL-OP2-TO3-P/ST-SS-120-TW

TW= True White (7000K)

## Tap Out Stik Double-Sided™

### PRODUCT OPTIONS

T-12	Actual Length	Lumens per Stik	No. of Mods	Watts	Max. Units (60W)	Max. Units (120W)	Whips	Part Number
18"	15.91"	1,000	8	10.56	5	10	1-3 ft.	PL-OP2-TO3-P/ST-DS-18-TW
24"	21.91"	1,000	8	10.56	5	10	1-3 ft.	PL-OP2-TO3-P/ST-DS-24-TW
30"	27.91"	1,500	12	15.84	3	6	1-3 ft.	PL-OP2-TO3-P/ST-DS-30-TW
36"	33.91"	1,750	14	18.48	3	6	1-3 ft.	PL-OP2-TO3-P/ST-DS-36-TW
42"	39.91"	2,000	16	21.12	2	4	1-3 ft.	PL-OP2-TO3-P/ST-DS-42-TW
48"	45.91"	2,250	18	23.76	2.5	5	2-3 ft.	PL-OP2-TO3-P/ST-DS-48-TW
60"	57.91"	3,000	24	31.68	1.5	3	2-3 ft.	PL-OP2-TO3-P/ST-DS-60-TW
64"	61.91"	3,000	24	31.68	1.5	3	2-3 ft.	PL-OP2-TO3-P/ST-DS-64-TW
72"	69.91"	3,250	26	34.32	1.5	3	2-6 ft.	PL-OP2-TO3-P/ST-DS-72-TW
84"	81.91"	4,000	32	42.24	1	2	1-6 ft.	PL-OP2-TO3-P/ST-DS-84-TW
96"	93.91"	4,500	36	47.52	1	2	1-6 ft.	PL-OP2-TO3-P/ST-DS-96-TW
108"	105.91"	5,000	40	52.8	1	2	1-6 ft.	PL-OP2-TO3-P/ST-DS-108-TW
117"	114.91"	5,250	42	55.44	1	2	1-6 ft.	PL-OP2-TO3-P/ST-DS-117-TW
120"	117.91"	5,500	44	58.08	1	2	1-6 ft.	PL-OP2-TO3-P/ST-DS-120-TW

TW= True White (7000K)



## Street Stik Series

## STREET STIK™ SERIES

*The industry's first retrofit solution for shallow cabinets*

## SPECIFICATIONS

Beam Angle	160° Low Dome Batwing Optic	
Certifications	UL & cUL Recognized (SAM Manual), CE, RoHS	
Dimensions	SS: 0.6"W x .71"H x Length DS: 0.6"W x 1.0"H x Length	
Efficacy	Cool White	95 LM/W
	True White	95 LM/W
	Natural White	95 LM/W
	Warm White	95 LM/W
Fastening	Socket (retro) / Brackets (new)	
Input	12VDC	
Intensity	Cool White	125 LM/ft
	True White	125 LM/ft
	Natural White	125 LM/ft
	Warm White	125 LM/ft
Max Mods (Series)	N/A	
Operating Temp	-40° to +60°C	
Packaging	SS/HD: 10 pieces per tube DS/HD: 8 pieces per tube	
Power (Watts)	See Product Options	
Power Supply	P-LED 12VDC	
Protection Grade	IP67	
Stiks per PS	See Product Options	
Spacing	See Product Options	
Warranty	5 Year Product / 5 Year Limited Labor	

Ask about our Qwik Stik  
Mounting Brackets for new  
construction jobs



## FEATURES

- Street Fighter Heavyweight™ modules pre-assembled onto a direct socket mount extrusion
- Get even more lumen output with the Street Stik HD™
- Available in all traditional T-12 lamp lengths from 8"-120" and fits directly into T-12 sockets
- Match CCT with any other Street Fighter product for a consistent color across all signage
- Modules and extrusion can be purchased separately



## WIRING DETAILS

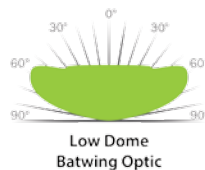
White/Red	Positive
White/Black	Negative

## RECOMMENDED COVERAGE CHART

Depth from Stik to Face	Estimated Spacing between Stiks
5"	10"
6"	12"
7" – 8"	16"
9" – 12"	18"

>12 (Use two banks Single-Sided)

Note: Product and depth may vary depending on face material and desired brightness.



## Street Stik Series



## Street Stik Single-Sided™

## PRODUCT OPTIONS

T-12	Actual Length	Lumens per Stik	No. of Mods	Watts	Stiks per 60W PS	Stiks per 120W PS	Part Number*
18"	15.91"	375	3.0	3.96	15.0	30.0	PL-OP2-HW3-P/ST-SS-18-XX
24"	21.91"	375	3.0	3.96	15.0	30.0	PL-OP2-HW3-P/ST-SS-24-XX
30"	27.91"	500	4.0	5.28	11.0	22.0	PL-OP2-HW3-P/ST-SS-30-XX
36"	33.91"	625	5.0	6.60	9.0	18.0	PL-OP2-HW3-P/ST-SS-36-XX
42"	39.91"	750	6.0	7.92	7.0	14.0	PL-OP2-HW3-P/ST-SS-42-XX
48"	45.91"	875	7.0	9.24	6.0	12.0	PL-OP2-HW3-P/ST-SS-48-XX
60"	57.91"	1000	8.0	10.56	5.0	10.0	PL-OP2-HW3-P/ST-SS-60-XX
64"	61.91"	1125	9.0	11.88	5.0	10.0	PL-OP2-HW3-P/ST-SS-64-XX
72"	69.91"	1250	10.0	13.20	4.0	8.0	PL-OP2-HW3-P/ST-SS-72-XX
84"	81.91"	1500	12.0	15.84	3.0	6.0	PL-OP2-HW3-P/ST-SS-84-XX
96"	93.91"	1750	14.0	18.48	3.0	6.0	PL-OP2-HW3-P/ST-SS-96-XX
108"	105.9"	1875	15.0	19.80	3.0	6.0	PL-OP2-HW3-P/ST-SS-108-XX
117"	114.91"	2125	17.0	22.44	2.0	4.0	PL-OP2-HW3-P/ST-SS-117-XX
120"	117.91"	2125	17.0	22.44	2.0	4.0	PL-OP2-HW3-P/ST-SS-120-XX

\*XX=WW (3500K Warm White), NW (5000K Natural White), TW (7000K True White), CW (9000K Cool White)

## Street Stik Double-Sided™

## PRODUCT OPTIONS

T-12	Actual Length	Lumens per Stik	No. of Mods	Watts	Stiks per 60W PS	Stiks per 120W PS	Part Number*
18"	15.91"	750	6.0	7.92	7.5	15.0	PL-OP2-HW3-P/ST-DS-18-XX
24"	21.91"	750	6.0	7.92	7.5	15.0	PL-OP2-HW3-P/ST-DS-24-XX
30"	27.91"	1000	8.0	10.56	5.5	11.0	PL-OP2-HW3-P/ST-DS-30-XX
36"	33.91"	1250	10.0	13.20	4.5	9.0	PL-OP2-HW3-P/ST-DS-36-XX
42"	39.91"	1500	12.0	15.84	3.5	7.0	PL-OP2-HW3-P/ST-DS-42-XX
48"	45.91"	1750	14.0	18.48	3.0	6.0	PL-OP2-HW3-P/ST-DS-48-XX
60"	57.91"	2000	16.0	21.12	2.5	5.0	PL-OP2-HW3-P/ST-DS-60-XX
64"	61.91"	2250	18.0	23.76	2.5	5.0	PL-OP2-HW3-P/ST-DS-64-XX
72"	69.91"	2500	20.0	26.40	2.0	4.0	PL-OP2-HW3-P/ST-DS-72-XX
84"	81.91"	3000	24.0	31.68	1.5	3.0	PL-OP2-HW3-P/ST-DS-84-XX
96"	93.91"	3500	28.0	36.96	1.5	3.0	PL-OP2-HW3-P/ST-DS-96-XX
108"	105.9"	3750	30.0	39.60	1.5	3.0	PL-OP2-HW3-P/ST-DS-108-XX
117"	114.91"	4250	34.0	44.88	1.0	2.0	PL-OP2-HW3-P/ST-DS-117-XX
120"	117.91"	4250	34.0	44.88	1.0	2.0	PL-OP2-HW3-P/ST-DS-120-XX

\*XX=WW (3500K Warm White), NW (5000K Natural White), TW (7000K True White), CW (9000K Cool White)

## Street Stik Series



## Street Stik HD Single-Sided™

## PRODUCT OPTIONS

T-12	Actual Length	Lumens per Stik	No. of Mods	Watts	Stiks per 60W PS	Stiks per 120W PS	Part Number*
18"	15.91"	500	4.0	5.28	11.0	22.0	PL-OP2-HW3-P/ST-SS-18-XX (HD)
24"	21.91"	500	4.0	5.28	11.0	22.0	PL-OP2-HW3-P/ST-SS-24-XX (HD)
30"	27.91"	750	6.0	7.92	7.0	14.0	PL-OP2-HW3-P/ST-SS-30-XX (HD)
36"	33.91"	875	7.0	9.24	6.0	12.0	PL-OP2-HW3-P/ST-SS-36-XX (HD)
42"	39.91"	1000	8.0	10.56	5.0	10.0	PL-OP2-HW3-P/ST-SS-42-XX (HD)
48"	45.91"	1000	8.0	10.56	5.0	10.0	PL-OP2-HW3-P/ST-SS-48-XX (HD)
60"	57.91"	1500	12.0	15.84	3.0	6.0	PL-OP2-HW3-P/ST-SS-60-XX (HD)
64"	61.91"	1500	12.0	15.84	3.0	6.0	PL-OP2-HW3-P/ST-SS-64-XX (HD)
72"	69.91"	1625	13.0	17.16	3.0	6.0	PL-OP2-HW3-P/ST-SS-72-XX (HD)
84"	81.91"	1875	15.0	19.80	3.0	6.0	PL-OP2-HW3-P/ST-SS-84-XX (HD)
96"	93.91"	2250	18.0	23.76	2.0	4.0	PL-OP2-HW3-P/ST-SS-96-XX (HD)
108"	105.9"	2375	19.0	25.08	2.0	4.0	PL-OP2-HW3-P/ST-SS-108-XX (HD)
117"	114.91"	2500	20.0	26.40	2.0	4.0	PL-OP2-HW3-P/ST-SS-117-XX (HD)
120"	117.91"	2625	21.0	27.72	2.0	4.0	PL-OP2-HW3-P/ST-SS-120-XX (HD)

\*XX=WW (3500K Warm White), NW (5000K Natural White), TW (7000K True White), CW (9000K Cool White)

## Street Stik HD Double-Sided™

## PRODUCT OPTIONS

T-12	Actual Length	Lumens per Stik	No. of Mods	Watts	Stiks per 60W PS	Stiks per 120W PS	Part Number*
18"	15.91"	1000	8.0	10.56	5.5	11.0	PL-OP2-HW3-P/ST-DS-18-XX (HD)
24"	21.91"	1000	8.0	10.56	5.5	11.0	PL-OP2-HW3-P/ST-DS-24-XX (HD)
30"	27.91"	1500	12.0	15.84	3.5	7.0	PL-OP2-HW3-P/ST-DS-30-XX (HD)
36"	33.91"	1750	14.0	18.48	3.0	6.0	PL-OP2-HW3-P/ST-DS-36-XX (HD)
42"	39.91"	2000	16.0	21.12	2.5	4.0	PL-OP2-HW3-P/ST-DS-42-XX (HD)
48"	45.91"	2000	16.0	21.12	2.5	4.0	PL-OP2-HW3-P/ST-DS-48-XX (HD)
60"	57.91"	3000	24.0	31.68	1.5	2.0	PL-OP2-HW3-P/ST-DS-60-XX (HD)
64"	61.91"	3000	24.0	31.68	1.5	2.0	PL-OP2-HW3-P/ST-DS-64-XX (HD)
72"	69.91"	3250	26.0	34.32	1.5	2.0	PL-OP2-HW3-P/ST-DS-72-XX (HD)
84"	81.91"	3750	30.0	39.60	1.5	2.0	PL-OP2-HW3-P/ST-DS-84-XX (HD)
96"	93.91"	4500	36.0	47.52	1.0	2.0	PL-OP2-HW3-P/ST-DS-96-XX (HD)
108"	105.9"	4750	38.0	50.16	1.0	2.0	PL-OP2-HW3-P/ST-DS-108-XX (HD)
117"	114.91"	5000	40.0	52.80	1.0	2.0	PL-OP2-HW3-P/ST-DS-117-XX (HD)
120"	117.91"	5250	42.0	55.40	1.0	2.0	PL-OP2-HW3-P/ST-DS-120-XX (HD)

\*XX=WW (3500K Warm White), NW (5000K Natural White), TW (7000K True White), CW (9000K Cool White)



## Street Stik Series

## SLIM STIK SERIES

*A remarkable Stik designed to light cabinets as shallow as 1.5" using the 170° Batwing optic of the Slim Mod™.*

## SPECIFICATIONS

Beam Angle	170° Ultra-Wide Low Dome, Batwing Optic
Certifications	UL & cUL Recognized (SAM Manual), CE, RoHS
Dimensions	SS: 1.1"W x 0.7"H x Length DS: 1.1"W x 1.0"H x Length
Efficacy	88 LM/W
Fastening	Socket (retro) / Brackets (new)
Input	12VDC
Intensity	63 LM/ft
Max Mods (Series)	N/A
Operating Temp	-30° to +60°C
Packaging	SS: 10 pieces per tube DS: 8 pieces per tube
Power (Watts)	See Product Options
Power Supply	P-LED 12VDC
Protection Grade	IP67
Stiks per PS	See Product Options
Spacing	See Product Options
Warranty	5 Year Product / 5 Year Limited Labor



**P-LED Stik Mounting Brackets**



## FEATURES

- The only Stik with a module that can illuminate 1.5" deep from LEDs to face
- Optimized for shallow multi-stroke boxes from 1.5" – 4" deep
- Available in all traditional T-12 lamp lengths from 8"-120"
- Aluminum backer for increased heat dissipation

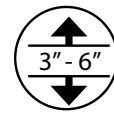
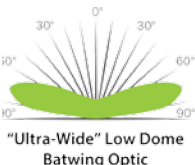
## WIRING DETAILS

White/Red	Positive
White/Black	Negative

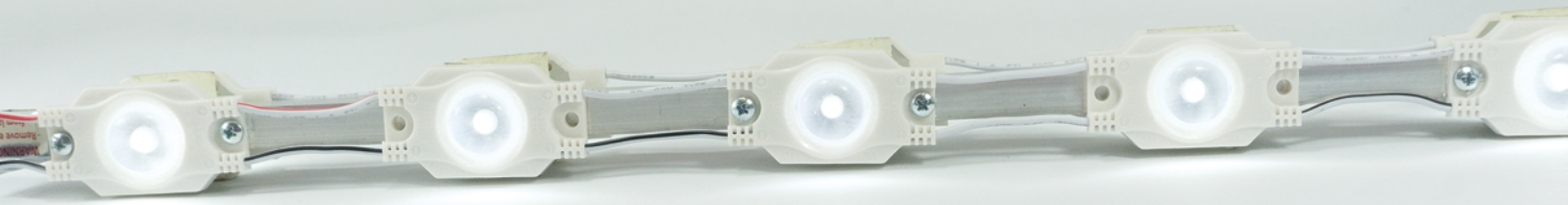
## RECOMMENDED COVERAGE CHART

Depth*	Max. Stroke	Spacing
	Single Row	Multi-Rows O.C.
3"	10"	4"
4"	12"	6"
5"	12"	8"
6"	12"	12"

*Note: Product and depth may vary depending on face material and desired brightness.*



## Street Stik Series



## Slim Stik Single-Sided™

## PRODUCT OPTIONS

T-12	Actual Length	Lumens per Stik	No. of Mods	Watts	Stiks per 60W PS	Stiks per 120W PS	Part Number*
18"	15.91"	275	5.0	3.6	16.0	32.0	PL-OP1-SL4-P/SL-SS-18-TW
24"	21.91"	385	7.0	5.04	11.0	22.0	PL-OP1-SL4-P/SL-SS-24-TW
30"	27.91"	495	9.0	6.48	9.0	18.0	PL-OP1-SL4-P/SL-SS-30-TW
36"	33.91"	605	11.0	7.92	7.0	14.0	PL-OP1-SL4-P/SL-SS-36-TW
42"	39.91"	715	13.0	9.36	6.0	12.0	PL-OP1-SL4-P/SL-SS-42-TW
48"	45.91"	825	15.0	10.8	5.0	10.0	PL-OP1-SL4-P/SL-SS-48-TW
60"	57.91"	1,045	19.0	13.68	4.0	8.0	PL-OP1-SL4-P/SL-SS-60-TW
64"	61.91"	1,100	20.0	14.4	4.0	8.0	PL-OP1-SL4-P/SL-SS-64-TW
72"	69.91"	1,210	22.0	15.84	3.0	6.0	PL-OP1-SL4-P/SL-SS-72-TW
84"	81.91"	1,430	26.0	18.72	3.0	6.0	PL-OP1-SL4-P/SL-SS-84-TW
96"	93.91"	1,650	30.0	21.6	2.0	4.0	PL-OP1-SL4-P/SL-SS-96-TW
108"	105.91"	1,870	34.0	24.48	2.0	4.0	PL-OP1-SL4-P/SL-SS-108-TW
117"	114.91"	2,035	37.0	26.64	2.0	4.0	PL-OP1-SL4-P/SL-SS-117-TW
120"	117.91"	2,090	38.0	27.36	2.0	4.0	PL-OP1-SL4-P/SL-SS-120-TW

\*XX=WW (3500K Warm White), NW (5000K Natural White), TW (7000K True White), CW (9000K Cool White)

## Slim Stik Double-Sided™

## PRODUCT OPTIONS

T-12	Actual Length	Lumens per Stik	No. of Mods	Watts	Stiks per 60W PS	Stiks per 120W PS	Part Number*
18"	15.91"	550	10.0	7.2	8.0	16.0	PL-OP1-SL4-P/SL-DS-18-TW
24"	21.91"	770	14.0	10.08	5.5	11.0	PL-OP1-SL4-P/SL-DS-24-TW
30"	27.91"	990	18.0	12.96	4.5	9.0	PL-OP1-SL4-P/SL-DS-30-TW
36"	33.91"	1,210	22.0	15.84	3.5	7.0	PL-OP1-SL4-P/SL-DS-36-TW
42"	39.91"	1,430	26.0	18.72	3.0	6.0	PL-OP1-SL4-P/SL-DS-42-TW
48"	45.91"	1,650	30.0	21.6	2.5	5.0	PL-OP1-SL4-P/SL-DS-48-TW
60"	57.91"	2,090	38.0	27.36	2.0	4.0	PL-OP1-SL4-P/SL-DS-60-TW
64"	61.91"	2,200	40.0	28.8	2.0	4.0	PL-OP1-SL4-P/SL-DS-64-TW
72"	69.91"	2,420	44.0	31.68	1.5	3.0	PL-OP1-SL4-P/SL-DS-72-TW
84"	81.91"	2,860	52.0	37.44	1.5	3.0	PL-OP1-SL4-P/SL-DS-84-TW
96"	93.91"	3,300	60.0	43.2	1.0	2.0	PL-OP1-SL4-P/SL-DS-96-TW
108"	105.91"	3,740	68.0	48.96	1.0	2.0	PL-OP1-SL4-P/SL-DS-108-TW
117"	114.91"	4,070	74.0	53.28	1.0	2.0	PL-OP1-SL4-P/SL-DS-117-TW
120"	117.91"	4,180	76.0	54.72	1.0	2.0	PL-OP1-SL4-P/SL-DS-120-TW

\*XX=WW (3500K Warm White), NW (5000K Natural White), TW (7000K True White), CW (9000K Cool White)